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ABSTRACT

The author of the present document maintains that today's graduate students in the arts and sciences are an elite group of individuals who have somehow survived the student attrition process. Data are presented that back up this statement, beginning with statistical data concerning high school students continuing through the senior year in college. The paper considers the rationale students use for not continuing their education, presents facts concerning the turnover in major field study choices, and gives personal statistics related to successful students. Furthermore, a comparison of the characteristics of those students enrolled in the sciences and those enrolled in the arts is offered throughout. (HS)

THE ARTS AND SCIENCE GRADUATE STUDENT

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University of Chicago

April, 1963

The Survivors

In their provocative book, Growing Old, Elaine Cumming and William E. Henry note that, compared with people in their seventies, the small proportion of very old people--those who survive to be eighty or more--show a number of striking differences:

> ...these eighty-year-olds have higher morale than the seventy-year-olds... These old people have less illness, probably because the attrition process has left only healthy ambulatory people in this age bracket...[1]

In short, beyond a certain point, age becomes not only a biological and social category, but also an index of rather unusual capacity for survival.

This book concerns a group of young people--graduate students in the Arts and Sciences in contemporary America--about whom we shall misunderstand much if we forget that they are a handful of survivors in a competitive social process that takes as its toll the overwhelming bulk of young Americans. The institutional structure of American education can well be interpreted as a social mortality table, relentlessly eliminating its subjects.

This fact is undeniable, but for a number of reasons we often fail to appreciate it. Our American ideology of equal opportunity makes discussion of educational mortality as touchy a subject as that of personal mortality. The fact that readers (and writers) of books move in that part of society where higher education is taken for granted blinds us to the smallness of that part. The historical increase in American educational attainment has led us understandably but erroneously to the belief that "today everybody is going to college."

Consequently, before turning to detailed research data, it will be worthwhile to seek some perspective by considering what the United States Census has to tell us about levels of educational mortality.

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[1]Elaine Cumming and William E. Henry, Growing Old: The Process of Disengagement (New York: Basic Books, 1961), pp. 202-3.

A) Educational Attainment As Social Mortality

It was not until very recently that national data were collected on levels of educational attainment beyond four years of college; consequently, we have only a meagre statistical description of that part of the population which continues its studies beyond the bachelor's degree. Nevertheless, recent reports from the Bureau of the Census' Current Population Survey provide some rather interesting facts.

TABLE 1.1

EDUCATIONAL ATTAINMENT OF THE CIVILIAN NONINSTITUTIONAL POPULATION, MARCH, 1959* AND MARCH, 1962**

(Cumulative Per cents)

Level	Total Population 25 and Older		Males, Ages 25-29	
	March, 1959	March, 1962	March, 1959	March, 1962
Elementary 1-4	97.8	98.0	99.4	99.4
Elementary 5-7	91.8	92.3	96.7	96.9
Elementary 8	79.2	80.6	89.3	91.5
High School 1-3	62.0	64.0	81.9	84.8
High School 4	43.7	46.4	63.9	65.8
College 1-3	16.3	18.1	27.5	30.8
College 4	8.1	9.0	14.7	17.2
College 5+	2.9	3.1	5.6	5.8

*Source: Current Population Reports, Population Characteristics, Series P-20, No. 99, Feb. 4, 1960.

**Source: Current Population Reports, Population Characteristics, Series P-20, No. 121, Feb. 7, 1963.

In a society where less than one-fifth have entered college and a little less than one-half have graduated from high school, those Americans who have completed a year or more of postgraduate college education fall in the top three per cent in terms of educational attainment. Because of historical changes in educational attainment and sex differences

in schooling, a fairer comparison is provided by considering only young men. Even here, the graduate students still stand out, being in the top six per cent in educational attainment. Among the younger men a little less than one-third had some college, and about two-thirds had graduated from high school.

Not all of those reporting five or more years of college are Arts and Science students, the group of most interest to us, and no firm figures are available on the number of Arts and Science graduate students because of difficulties of definition and the generally thin state of statistical reporting on higher education. Our guess is that a quarter of all graduate students study in Arts and Science fields, this very rough estimate stemming from the following: a) NORC's survey of June, 1961 college seniors[2] found that 30 per cent of those planning graduate study indicated an Arts and Science field, and follow-up research on the sample has indicated that the students' predictions are quite accurate; b) a rough classification of master's, Ph.D. and graduate professional degrees awarded in 1959-1960 yielded a figure of 25 per cent in Arts and Sciences.[3] Neither figure is to be considered as more than suggestive, but since they cover the "entrance and exit" and are close to one another, it seems fair to conclude that somewhere around a quarter of the students who go on for advanced study register in Arts and Science fields.[4]

Putting these two facts together, we may guess that: <u>Those Americans who have completed a year or more of Arts and Science training beyond the four year bachelor's degree constitute an educational elite amounting to about one per cent of the adult population</u>.

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[2] A detailed description of this sample and an extensive analysis of those students who anticipated careers in Arts and Science fields are given later in this chapter.

[3] Harry Hansen, <u>The World Almanac</u>, 1963 (New York: New York World-Telegram and The Sun, 1963), p. 540.

[4] The per cent of <u>current</u> students in Arts and Sciences is a slightly different matter, since variations in the duration of various programs will affect this figure.

This estimate, even though it points up the special character of the group we are studying, is a sort of snapshot taken at a given instant in an institutional structure which is changing very rapidly. Therefore, it is important to evaluate it in terms of the available information on trends in American education.

Trends in Higher Educational Attainment

Since college graduates in general and graduate students in particular still constitute only a very small proportion of the total population, is it really possible that, as educational opportunities expand, graduate study will be "deflated" to the place of, say, undergraduate training fifty years ago? To a considerable extent, this appears to be the case, but certain important qualifications must be added.

As everyone knows, tremendous changes have been taking place in the level of educational attainment in this century, particularly since World War II. The most commonly cited figures are those for school enrollment, as reported by the U.S. Census. Table 1.2 summarizes the main trends since 1910. The changes are indeed phenomenal. For example, the percentage of 16- and 17-year-olds in school rose from 43 in 1910 to 81 in 1960! Thus the late teenager in 1960 had almost twice the probability of being in school as his predecessor in 1910.

Although these are the figures which are most commonly cited in discussions of the "boom" in higher education, they are limited by the fact that the correlation between age and type of schooling is far from perfect. If the 1961 figures in Table 1.2 b) hold throughout the century, one-fourth of the 18- and 19-year-olds were in high school, not college, so it is impossible to tell whether the rise of the curve for the 18- and 19-year-olds comes from increases in college entrance, increases in high school completion, or both.

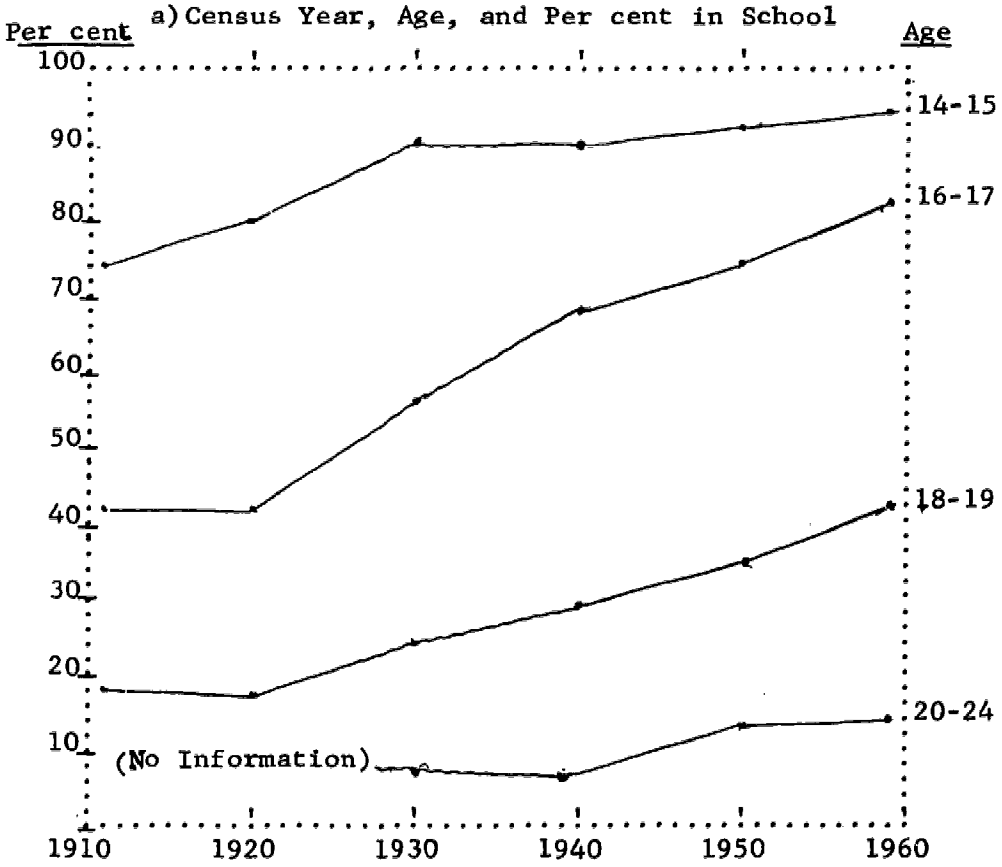
Granted this qualification, Table 1.2 a) suggests a set of staggered "take-off" periods. Rates for the 14- and 15-year-olds (elementary school) in each census from 1910 on, rates for the 16-

through 19-year olds (high school) rose only after the 1920 Census, and rates for the 20 to 24-year-old group (college) did not rise until after World War II. It would appear that while elementary education began to expand before 1910, the "high school explosion" came in the decade after World War I, and the "college explosion" in the decade after World War II.

TABLE 1.2

PER CENT IN SCHOOL BY CENSUS YEAR AND AGE*

a) Census Year, Age, and Per cent in School



*Source: U. S. Census of Population, 1960, General Social and Economic Characteristics, United States Summary, Final Report PC (1) - (1C), Table 74.

TABLE 1.2--Continued

b) Age and Type of School--October, 1961
(Current Population Characteristics,
Series p-20, 117, July, 1962)

Age	Elementary	High School	College	Total
14-15	15.8	84.2	-	100.0
16-17	1.5	93.8	4.7	100.0
18-19	0.3	24.4	75.3	100.0
20-24	0.2	4.5	95.3	100.0

In order to examine specific levels of education it is necessary to shift to data on educational attainment rather than enrollment by age. Unfortunately these materials are available only from 1940, so earlier trends cannot be followed directly. An approximation of such an historical series can be gained by looking at educational attainment for men of various ages at one particular time. Table 1.3 reports the level of schooling for men aged 20 and over in March, 1959.

TABLE 1.3

EDUCATIONAL ATTAINMENT OF MEN 20 AND OVER, MARCH, 1959 *

a) Cumulative Per cent

	Years of School Completed		Age, 1959						
			20-24	25-29	30-34	35-44	45-54	55-64	65+
			18 years old in--						
			'53-'57	'48-'52	'43-'47	'33-'42	'23-'32	'13-'22	1912 and Earlier
A	Elementary	8	91.8	89.3	91.4	85.6	78.8	69.6	54.3
B	High School	1-3	83.6	81.9	81.4	73.0	58.4	41.8	28.8
C	High School	4	64.3	63.9	58.1	52.3	38.2	26.6	18.8
D	College	1-3	27.2	27.6	26.3	21.1	17.2	12.5	10.1
E	College	4	6.8	14.8	15.9	11.5	9.6	6.7	5.6
F	College	5+	1.6	5.6	6.0	5.3	4.6	2.6	2.4

*Calculated from Current Population Reports, Series P-20, No. 99, Feb. 4, 1960, Table 1, p. 13.
("School years not reported" excluded from base.)

TABLE 1.3--Continued

b) Conditional Probabilities

Years of School Completed	Age, 1959						
	20-24	25-29	30-34	35-44	45-54	55-64	65+
	18 years old in--						
	'53-'57	'48-'52	'43-'47	'33-'42	'23-'32	'13-'22	1912 and Earlier
High School							
Entrance (B/A)	91.1	91.7	89.1	85.3	74.1	60.0	53.0
Graduation(C/B)	76.9	78.0	71.4	71.6	65.4	63.6	65.3
College							
Entrance (D/C)	42.3	43.2	45.3	40.3	45.0	47.0	53.7
Graduation(E/D)	25.0	53.6	60.4	54.5	55.8	53.6	55.4
Postgraduate							
Entrance (F/E)	23.5	37.8	37.7	46.1	47.9	38.8	42.8

As in the case of enrollment, the data for educational attainment suggest a dramatic expansion of educational opportunity. Examining rows A through F in Table 1.3 a), one can find some striking differences. For example, comparing the 20 to 24-year-olds (who reached the age of 18 in the middle '50's) with the 65 and older group (who reached 18 in 1912 before the high school explosion):

1) A higher rate of high school completion exists among the youngest group than does elementary school completion among the oldest.

2) About the same per cent of the youngest men had entered college as had entered high school among the oldest men.

It would appear that in the 1960's, college training has about the same scarcity value as high school training had at the turn of the century. If so, one wonders whether our initial speculation--that graduate training is about to become the social equivalent of undergraduate training 50 years ago--is so farfetched.

A different way of looking at the same information casts some doubt on this idea. Because the completion of a given level of education is necessary for advancement to the next level, the figures in Table 1.3 a) can also be expressed as conditional probabilities, for example, treating high school graduates not as a per cent of all men, but as a per cent of those who entered high school. The bottom of Table 1.3 [1.3 b)] gives these conditional probabilities.

Looking first at secondary education, we see a general increase in conditional probabilities as we move from the older to the younger men. For those 65 and older, 53 per cent of those who completed eight grades entered high school, but among the youngest men the figure is 91 per cent. That is, the increase in secondary attainment comes not just from increasing the proportion of young men who get to eighth grade and are thus made "available," but also from an increase in the proportion of high school entrants who graduate. It is a fact, and a sobering one, that even at midcentury about one-third of our young men were not graduating from high school; but compared with the past, secondary education shows a steady historical increase in conditional probabilities.

Turning to higher education, no such increase in conditional probabilities is shown:

1) In terms of college entrance, around 45 per cent of the high school graduates completed one or more years of college (many, of course, had left without finishing a full year) regardless of age. Forty per cent of those who were graduated from high school in the depressed 1930's completed some college, as did 42 per cent of the young men who were graduated from high school in the booming middle 1950's. Viewed this way, the increase in college enrollment seems to be coming mostly from the increase in the high school graduate base, not from improved chances for college entrance among high school graduates. It certainly may be argued that in order for the percentage to remain around 45 the colleges are dipping down to take less promising

freshmen or, more likely, that particular schools and types of schools are expanding to handle this group; but unless the structure of higher education changes rapidly, a ceiling will be reached.

2) When we look at the percentage of college entrants who report the completion of four or more years, we see, in every age group, that from 40 to 45 per cent have not been graduated. Again, while it may be that higher education has been lowering standards to keep the proportion constant, it is clear that no radical change has taken place in the high attrition rates of higher education.

3) Because no figures on graduate training have been previously available, the conditional probabilities for completion of one year of graduate training are surprising. To begin with, they increase with age up to ages 45 to 54. Because graduate study is often postponed--the first report of NORC's study of graduate Arts and Science students showed that more than 40 per cent had a gap of one or more years between the bachelor's degree and entry into graduate study[5]--the figures for different age groups cannot be used to infer changes over time. (Further, these percentages are based on sampling and have a standard error of one or two per cent.) More important, postgraduate study is not a rarity: close to 40 per cent of male college graduates, age 25 or over, report a year or more of advanced study. For women age 25 and over, the conditional probabilities are roughly 0.25.

Because the use of cross-sectional age comparisons may be deceptive (mortality, for example cannot be controlled in such comparisons), it is important to note that constant proportions also appear when conditional probabilities are calculated separately for the 1940, 1950, and 1960 Censuses.

While no figures from different Censuses are available for graduate training, it appears that the twenty years of extraordinary social change between 1940 and 1960 saw no increase in the per cent of high school graduates who had gone on to complete one or more years of college or in the per cent of college students who managed to graduate, even though the raw percentages show the expected pattern of increase.

[5]James A. Davis, et. al., Stipends and Spouses: The Finances of of American Arts and Science Graduate Students, University of Chicago Press, 1962, p. 165.

TABLE 1.4

EDUCATIONAL ATTAINMENT OF MEN 25 AND OLDER*

[U.S. Census of Population, 1960, General Social and Economic Characteristics, United States Summary, Final Report Pc(1)-1c, Table 76]

a) Cumulative Per cent

	Educational Attainment	Year			1960 Minus 1940
		1940	1950	1960	
A	Elementary 8	65.9	70.8	76.0	+10.1
B	High School 1-3	37.1	49.4	58.2	+21.1
C	High School 4	22.6	32.5	39.5	+16.9
D	College 1-3	10.4	14.3	18.3	+ 7.9
E	College 4	5.5	7.3	9.7	+ 4.2
	b) Conditional Probabilities				
	High School				
	Entrance (B/A)	56.3	69.8	76.6	+10.3
	Graduation (C/B)	60.9	65.8	67.9	+ 7.0
	College				
	Entrance (D/C)	46.0	44.0	46.3	+ 0.3
	Graduation (E/D)	52.9	51.0	53.0	+ 0.1

*Calculated from Current Population Reports: Population Characteristics, Series P-20, No. 99, Feb. 4, 1960, Table 1.

What does all this mean for understanding the recruitment of graduate students? We would suggest two themes:

First, it is misleading to predict, by extrapolating the history of American high schools, what will happen in our colleges and graduate schools. That the conditional probabilities for higher education show no historical change, while the conditional probabilities for elementary and secondary education increase relentlessly, suggests that higher education continues to maintain a strongly selective character (which

is not to say that its selection is on purely intellectual grounds or desirable) despite a trend toward universal completion in the lower levels. The reasons are hardly mysterious. To cite only the most obvious ones: While almost all American youths have a legal right to free high school training while living at home, no such principle has been advanced in theory or practice for higher education (although the California system of higher education may lean this way). Up to certain ages youths are under legal compulsion to attend grammar and high school, but no such idea has appeared for higher education. Although there is some variation, the "educator's" assumption that curricula should be adapted to guarantee graduation has not permeated higher education. Even the most "democratic" spokesmen say that "everyone should finish high school" but "everyone should have a chance to finish college."

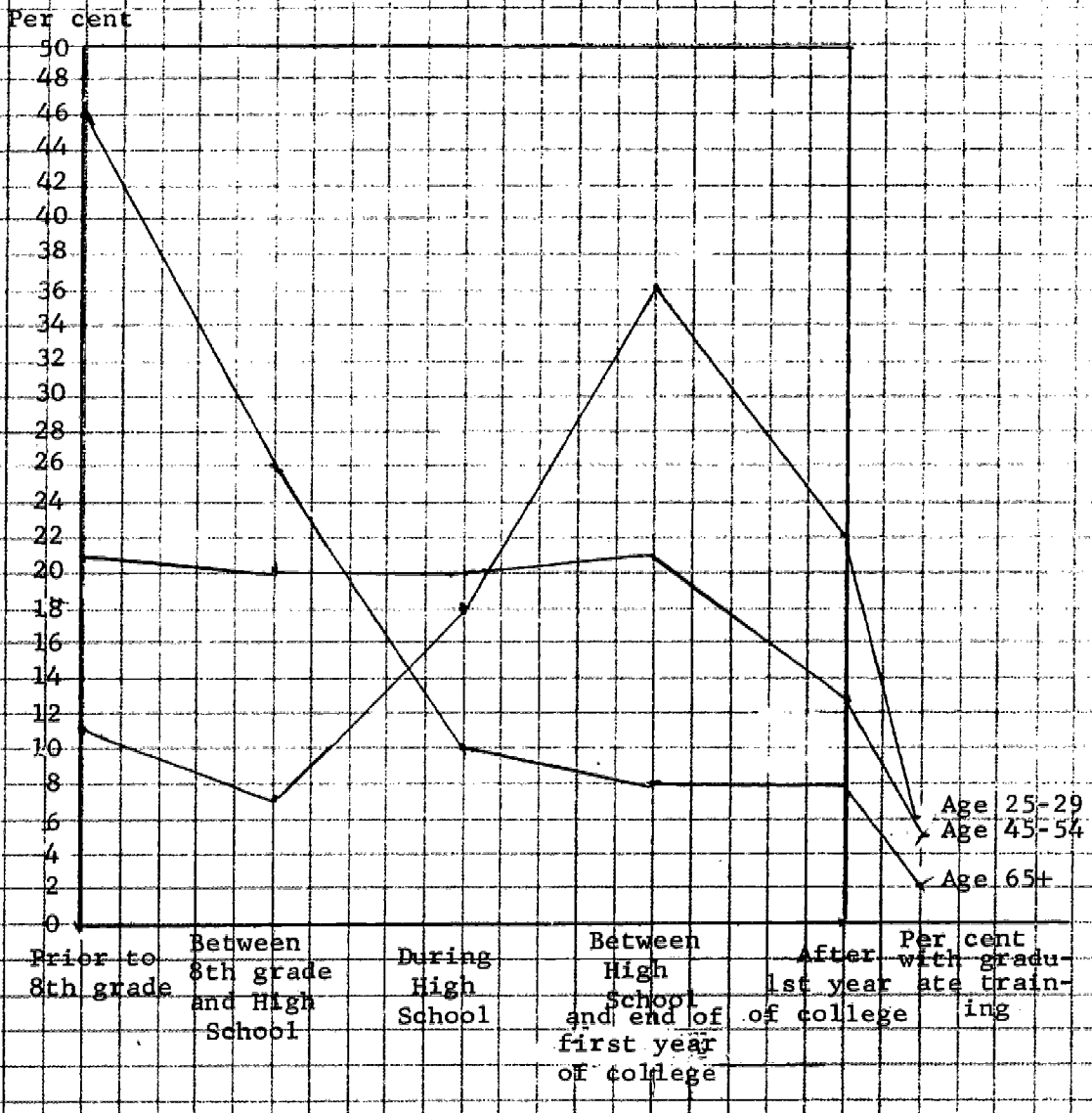
Second, the net result of these various trends is that undergraduate college is becoming the key screening mechanism for education in general and for graduate education in particular. If the per cent of men in a given row of Table 1.3 a) is subtracted from the per cent above it, the result is the per cent of all men who were "screened out" between the two levels. Thus, for the 20-24-year-olds, subtracting 83.6 (the second row) from 91.8 (the first row) gives 8.2 per cent of this group screened out between eighth grade graduation and the end of the first year of high school.

Table 1.5 shows the time trend in graph form, by plotting the screening figures for three age groups in 1959: men 65 plus, men 45-54, men 25-29. Each curve has a distinctive pattern.

For men age 65 and older, who reached age 18 before World War I, the greatest attrition was prior to eighth grade, when 46 per cent of the total were screened out of the educational system. Each subsequent step removed a smaller proportion, with only eight per cent screened out after one or more years of college (i.e., completed one or more years of college but did not complete a year or more of graduate school).

TABLE 1.5

PER CENT OF TOTAL MEN "SCREENED OUT" AT VARIOUS STAGES FOR SELECTED AGES



For men ages 45-54, a group which reached age 18 during the 1920's, the line is almost straight, each step in the process taking an equal bite out of the group, and the per cent lost to graduate school after a year or more of college rising to 13.

For men ages 25-29, who reached age 18 shortly after World War II, the curve is skewed to the right. Prior to high school graduation relatively low percentages are lost, and it is entry into and survival in higher education which cuts a swath through the group. One third (36 per cent) are lost between high school graduation and the end of the first year of college, and 22 per cent complete a year of college but do not complete a year of graduate school.

Looking at the right-hand column we see that graduate students are a minority of six per cent or less in all these age groups, but there is a big difference in the timing of the selection process today. Increasingly, experiences after the freshman year in college determine which of the nation's young people will survive to enter graduate study. While 10 per cent of the pre-World War I generation of men were exposed to the influence (favorable and unfavorable) of college experience, 28 per cent of the post-World War II generation make their crucial decision (or have that decision made by someone else) after the first year of college.

Just as increasing length of life makes geriatric medicine more crucial than pediatric medicine in understanding longevity, so the changing structure of American education makes attrition during the college years of greater significance in educational mortality. No systematic evidence is available on the implications of this qualitative change, but some hypotheses come to mind. First, one may guess that sheer economic pressures will come to play a decreasing part in determining social survival, just as measles and mumps are coming to have a lesser importance in medical mortality. It is clear from a wide variety of studies that parental socio-economic status plays a lesser role in attrition during college than in entrance to college, and a lesser role in entrance to college than in completion of high school. One may hazard the guess

that the trend is for the students' own personal characteristics to become increasingly important and the socio-economic status of his parents to play a lesser part in determining who will reach the elite positions.

Second, one may guess that college professors will come to have an increasingly strategic role in selecting the nation's elite, while primary and secondary teachers will come to have a correspondingly decreasing role. Here the analogy with medicine tends to break down in important ways. While it may be that primary and secondary teachers adopt the medical ethic of "trying to save" all their clients, we have suggested that these values do not permeate higher education. The college admissions officer and the college teacher, more than the primary and secondary educator act as judges, not physicians. Thus, young Americans should be aware of the old Spanish proverb cited (or more probably invented) by Edgar Friedenberg, "It is more frightening to be told one has six months to live by a judge than by a physician." Since college faculties are distinctive in their sex composition, training, values, and social status, and make their decisions with comparatively little review by higher authorities, it would appear that considerable attention should be given to increasing our knowledge of college professors, their recruitment, standards, and predilections.

Up to this point we have been speaking of the negative aspects of the educational process, the ways in which the various levels of education act to screen out the vast bulk of young men and women, leaving only a handful of survivors to enter graduate training. Equally important is the process by which college experience has a positive effect, diverting the career choices of young people from other career lines into Arts and Science fields. We shall see that for college graduates as a whole, the net effect of four years of college is to increase the proportion aiming for Arts and Science careers and thus becoming potential recruits to Arts and Science graduate schools.

With this in mind, let us shift our attention from the screening process to the sorting process.

B) The Sorting Process Among the Survivors

Although those Americans employed in Arts and Science career fields constitute too small a fraction of the working population to make Census information on them of much help to us, an inspection of Census data on broad occupational groups will give us important background on the sorting process.

Higher Education and Occupation

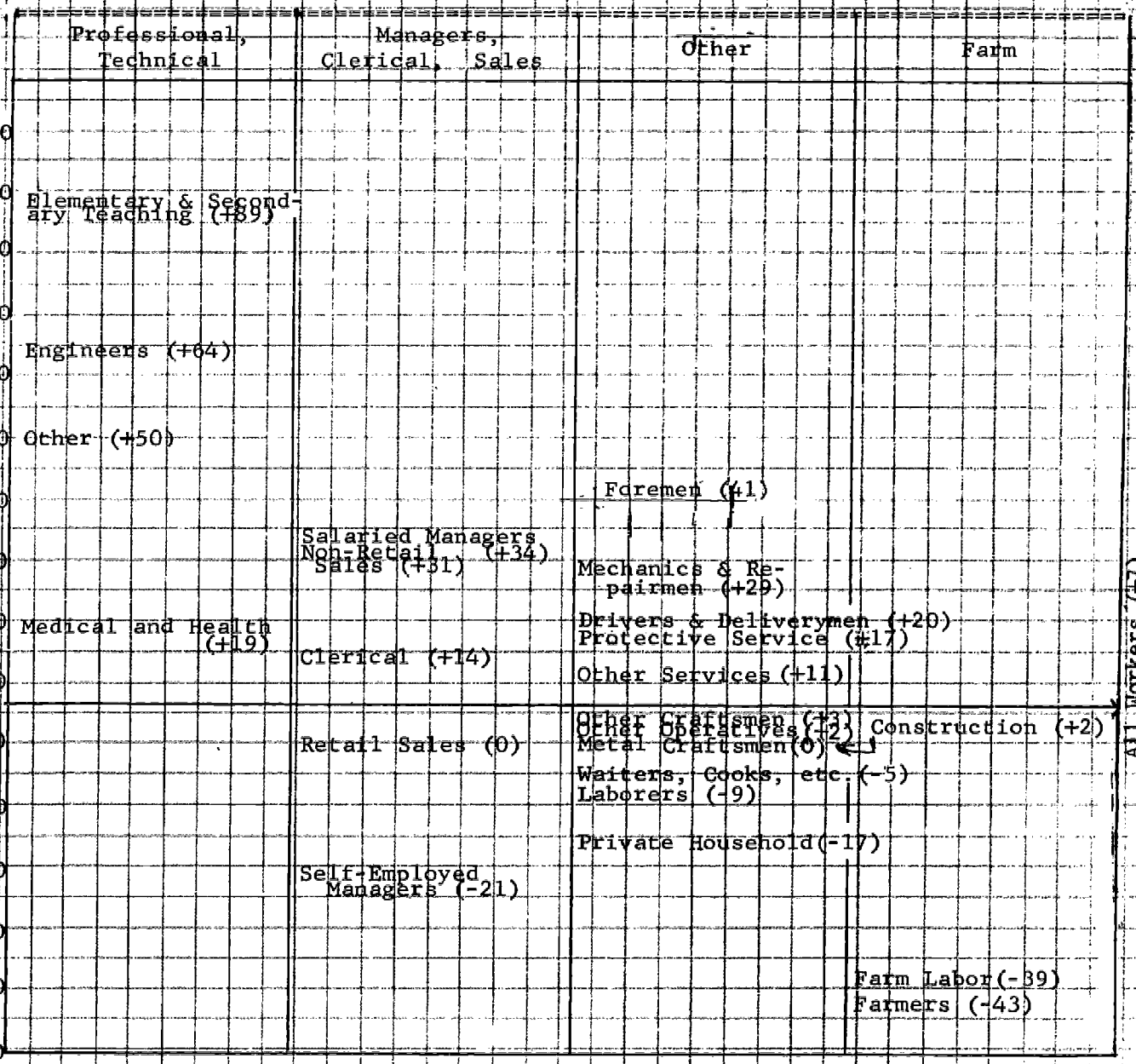
The key word here is professionalization. Although the world of work is so complex as almost to defy classification, three broad types of employment stand out. At the bottom of the heap in salary, training, and social status, lie a very large number of skilled, semi-skilled, service, and unskilled occupations, which we can lump together as "other," because our major attention is on the upper reaches of the occupational system. At the top, however, there are two quite different types of work, professions (teaching, engineering, medicine, law, nursing, etc., etc.) and business occupations (proprietors, managers, officials, sales, and clerical).

The single most important trend in the occupational structure today is the phenomenal increase in the size of professional occupations. The long term trend dates back to the 19th Century, but the striking change may be seen by simply comparing the 1950 and 1960 Censuses. Table 1.6 summarizes the percentage change in the sizes of various occupations between 1950 and 1960 for employed males.

Between 1950 and 1960, we see that: a) the number of farm workers dropped about 40 per cent; b) in the other and business occupations, increases and decreases were about equally common; c) each subgroup of the professions showed an increase.

TABLE 1.6

PERCENTAGE INCREASE, EMPLOYED MALES, 1950-1960
(U S. Census of Population, 1960, United States Summary, General Social and Economic Characteristics, Table 89)



With this secular trend in mind, let us shift to the relationship between occupation and educational attainment. Because appropriate data are not available from different census years, again we shall compare men of different ages at one particular time. Table 1.7 shows the 1950 occupational distribution of men of various ages and educational attainments in the three broad categories: professional, businees, and other.

TABLE 1.7

EDUCATION AND OCCUPATION, EMPLOYED MALES, 1950

(Farmers and Farm Managers Subtracted from Base)

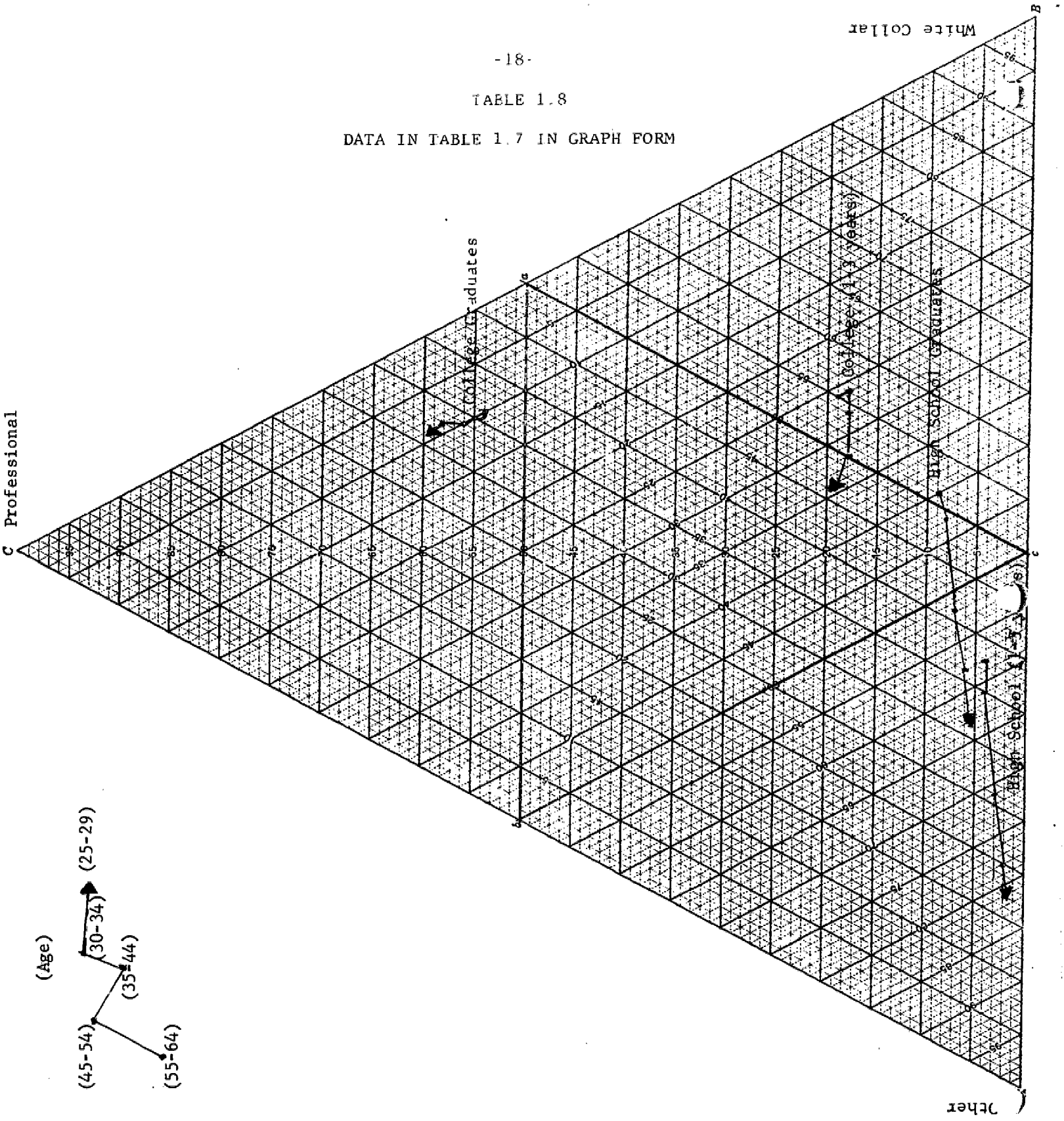
(U S Census of Population: 1950, Vol. IV, Part 5, Chapter B, Education, Table 11)

Occupation and Educational Attainment	Age				
	25-29	30-34	35-44	45-54	55-64
Per cent Professional, Technical, and Kindred					
College 4	58.7	58.0	56.3	54.1	54.8
College 1-3	18.7	18.4	17.9	18.5	18.8
High School 4	5.6	6.0	6.6	7.8	8.7
High School 1-3	2.0	2.0	2.8	3.5	4.0
Per cent Business (Managers, Sales, Clerical)					
College 4	31.1	32.6	34.4	36.1	34.6
College 1-3	47.4	49.6	53.5	56.2	55.1
High School 4	31.4	35.6	41.2	49.?	51.0
High School 1-3	17.2	20.0	26.0	34.6	38.2
Per cent Other (Skilled Operatives, Unskilled, Service, Farm Labor)					
College 4	10.2	9.4	9.3	9.8	10.6
College 1-3	33.9	32.0	28.6	25.3	26.1
High School 4	63.0	58.4	52.2	57.1	40.3
High School 1-3	80.8	78.0	71.2	61.9	57.8

The import of the table is made more clear when the figures in Table 1.7 are presented in the form of a graph (Table 1.8).

TABLE 1.8

DATA IN TABLE 1.7 IN GRAPH FORM



The association between educational attainment and occupation is indeed a strong one, the four "arrows" in the graph—representing the occupational distribution of various educational attainment groups--being widely separated. The majority of working male college graduates, of each age level, are in the professions. What is even more important, however, is that it is only the college graduates who have any considerable share of professional work, the next highest group (part college) having less than 20 per cent in professional work regardless of age. Thus, a bachelor's degree is not only a ticket of admission to the upper occupational strata, but it is also a ticket, and about the only valid one, to a particular kind of work: professional and technical employment.

Now, let us compare age groups, following the points on the arrow for each educational attainment group:

1) Among college graduates, the young men are even more likely to be in the professions and less likely to be in business occupations than are older men, the proportion in "other" being constant and small.

2) For the part-college men, the per cent in white collar work declines and the per cent in blue collar work increases as one moves from older to younger men, and there is no change in the per cent in professions.

3) The "deflation" in the high school degree is suggested by the fact that among high school graduates ages 55-64, 60 per cent have white collar or professional jobs, in contrast to 37 per cent among men ages 25-29. That is, among the oldest men, a high school degree means a middle-class job, while among the youngest men it means a working class job.

4) At all age levels, the part-high school group have predominantly working-class jobs, but the minority with middle class jobs drops from 42 per cent among the men ages 55-64 to 19 per cent among those 25-29.

The implications may be summarized in a single sentence: The increasing educational attainment and increasing professionalization of the

American occupational structure result in increasing "professionalization" of college graduates and declining occupational "return" of all other educational attainment levels.

The data in Table 1.8 are based on cross-sectional age comparisons, and may be deceptive to the extent that seniority and experience allow older men to get better jobs regardless of their education. Let us therefore compare the relationship between education and occupation at two different points of time.

TABLE 1.9

OCCUPATION AND EDUCATION, 1950 AND 1959*

(Employed Males 18 and Over, Farmers and Farm Managers Excluded from Base)

Occupation	Education			
	High School		College	
	1-3 Years	4 Years	1-3 Years	4 Years
Per cent Professional or Business				
1959	24.2	42.2	68.6	91.9
1950	29.7	45.8	70.8	90.2
1959 minus 1950	-5.5	-3.6	-2.2	+1.7
Per cent Professional				
1959	2.2	6.4	18.4	60.0
1950	3.0	6.7	18.5	56.6
1959 minus 1950	-0.8	-0.3	-0.1	+3.4
Per cent Business				
1959	22.0	35.8	50.2	31.9
1950	26.7	39.1	52.3	33.6
1959 minus 1950	-.47	-3.3	-2.1	-1.7

*Source: 1950: U.S. Census of Population: 1950, Vol. IV, Special Reports, Part 5, Chapter B, Education, Table 11.

1959: Current Population Reports, Population Characteristics, Series P-20, No. 99, Table 5.

Table 1.9 gives the distribution into the three types of work for men of different educational attainments in 1950 and 1959. Even this short period shows definite shifts. Looking at the bottom set of figures we see a decline in the per cent with middle-class jobs for the part-high school, high school graduate, and part-college men, and a slight increase for the college graduates. Inspection of the sub-tables for professional occupations and business occupations confirms our previous idea that college graduates are improving their grip on the elite occupations by increasing professionalization, while all other attainment groups are forging behind, as it were, because of lessened access to business jobs (trends in professionalization making little difference below the bachelor's degree because the less-educated groups never did have much access to professions).

While these figures are of intrinsic importance for anyone concerned about the nation's occupational structure, our major interest is in what these data suggest about recruitment to Arts and Science fields. Two conclusions are worth noting:

First, everything in Tables 1.6 through 1.9 serves to underline our claim that selection during college is becoming increasingly crucial. Not only are more and more of the key selections being made during the college years, but the "cost" of failing to complete a bachelor's degree is increasing, while the "reward" for completion is also increasing. In terms of our interest in the recruitment of college faculties, it now appears that not only is their role in determining educational attainment looming larger, but they are coming to have much more power in determining access to middle-class occupations of any type, and almost "complete" power in determining entrance into the professions. Tables 1.6 through 1.9 serve to whet our curiosity on the recruitment to college teaching, a problem to be treated at length in this volume.

Second, concerning recruitment to the Arts and Science fields, the import of these tables is that competition for college graduates is increasing, as professionalism increases and non-college graduates fail to crash the barriers. More important, perhaps, is the suggestion that

recruiters to Arts and Science careers are competing essentially with the lures of other professional occupations rather than with business. One of the great myths of American intellectuals is that American college students are business-oriented and that college faculties are engaged in a struggle to interest the students in more noble careers. Thus, Paul Goodman, in a recent magazine article, says, "(in a) boys college, 90 per cent of the young men are preparing to be tomorrow's executives in some phony work where the product being manufactured is not really necessary." Census materials and later chapters of this volume suggest that this is not the case. Rather, those students who shun Arts and Science careers are headed for engineering, primary and secondary education, law, medicine, architecture, etc., and not the sale of investments or personnel work. This raises problems of "marginal" differentiation; the scramble for college graduates appears to be among those occupations which have considerable "intellectuality," which we shall see is the prime attraction of Arts and Science fields.

Having reviewed the broad demographic setting necessary for understanding the choice of occupation among those who receive the bachelor's degree, we are ready to treat the main problem of this chapter: the factors influencing choice of Arts and Science fields as careers among the small number of young men and women who are the survivors of the social selection process and who are largely destined for entry into one or another professional job.

Recruitment to Arts and Science Careers

Even a cursory look at the scholarly literature reveals an amazing variety of hypotheses and opinions on the factors which lead young people into or away from Arts and Science careers. It has been suggested that students from humble socio-economic origins are attracted to Arts and Sciences as a channel of upward mobility, and that students from high status origins are more likely to possess the aristocratic intellectual values associated with these fields. Some have claimed that Catholics eschew Arts and Sciences (particularly Science) because they lack the

Protestant ethic, and others have claimed that Jews flock into these fields because of their tradition of scholarship. It has been suggested that the professor is a high status figure who attracts disciples, and it has been further suggested that American college experience has a fundamentally anti-intellectual cast which diverts students from Arts and Science careers. It is claimed that attendance at specific institutions has a strong effect on choice of Arts and Science careers, and that the very desire to attend these institutions is indicative of a predisposition toward those careers.

Rather than reviewing this welter of studies and speculations, let us turn to a set of data which enable us to consider simultaneously a large number of possible variables.

In the Spring of 1961 the National Opinion Research Center surveyed some 34,000 college seniors, sampled from 135 colleges and universities in such a fashion as to be a representative probability sample of June, 1961 bachelor's degree recipients.[6] The self-administered questionnaire covered career plans, intentions for graduate study, family background characteristics, college experiences, grades, occupational values and interests, as well as retrospective information on career plans at time of entry into college; this enables us to consider in some detail the factors associated with choice of an Arts and Science career.

Stability and Turnover During College

An unusually large sample, such as these 34,000 college seniors, provides a Social Science equivalent of a microscope, for it is possible to draw, from the total sample, subsamples large enough to provide reliable results even though they constitute a very small fraction of the total sample. At the same time, by correctly "weighting" the findings, it is possible to derive estimates for the total population.

With these ideas in mind, a special deck of IBM cards was constructed by sampling from the total returns in such a fashion that: 1) students who reported an Arts and Science career as freshmen and/or at graduation[7] were oversampled; 2) students who reported neither freshman nor current career plans in a Social Science or Arts and Science field were undersampled.

[6]Cf. James A. Davis, Great Aspirations: Career Decisions and Educational Plans During College, Volume I.

[7]The question-wordings are: "Please give what you expect to be your long-run career and ignore any school, stop-gap job, or temporary military service which might precede it," and "Career preference when you started college. Give your single strongest preference even if it was vague or if there were several alternatives."

The resulting sample consisted of the following numbers of cases:

TABLE 1.10

DISTRIBUTION OF CASES IN ARTS AND SCIENCE ANALYTICAL DECK

Freshman Career Preference	Senior Career Preference			Total
	Physical or Biological Sciences ("Science")	Social Sciences, Humanities, Fine Arts ("Letters")	All Other	
Science	707	130	524	1,361
Letters	30	691	635	1,356
All Other and None	558	852	1,239	2,649
Total	1,295	1,673	2,398	5,366

While these figures are important for assessing the statistical reliability of the results for particular subgroups, it would be deceptive to present tables based upon these raw figures, for the numbers of Arts and Science students are deliberately inflated. The subsample was designed, however, so that correct weights could be obtained by simply multiplying by ten the results for the 1,239 "Other-Other" cases. Thus, the correctly weighted case bases are as follows (we shall use an asterisk to denote a weighted case base).

TABLE 1.11

WEIGHTED CASE BASES

Freshman	Senior			Total
	Science	Letters	Other	
Science .	707	130	524	1,361
Letters .	30	691	635	1,356
Other . .	558	852	12,390*	13,800*
Total	1,295	1,673	13,549*	16,517*

Within the Arts and Science fields, careers were classified into two groups, as follows (fields are taken from the checklist used by the respondents to classify themselves):

Science: Astronomy, Astrophysics, Chemistry, Physics, Geography, Geology, Geophysics, Oceanography, Metallurgy, Meterology, Physical Science General and Other, Anatomy, Biology, Biochemistry, Botany and Related Plant Sciences, Biophysics, Entomology, Genetics, Microbiology, Pathology, Pharmacology, Physiology, Zoology, Other Biological Science.

Letters: Fine and Applied Arts, English and Creative Writing, Classical Languages and Literatures, History, Modern Foreign Languages and Literatures, Philosophy, Humanities General and Other, Clinical Psychology, Social Psychology, Experimental and General Psychology, Other Psychological Fields, Anthropology, Archeology, Economics, Area and Regional Studies, Political Science, International Relations, Sociology, Social Science General and Other.

The residual group of "Other" covers a wide variety of fields, among which are business, engineering, primary and secondary education, health professions, agriculture, social work, law, theology, etc. and for freshman preference only, "Absolutely no preference."

While there would have been sufficient cases to justify a more detailed breakdown of the Arts and Science fields, we decided to treat only the crude distinction between "Science" and "Letters." Our reasons were two: First, a detailed analysis of social characteristics of students anticipating graduate work in various specific fields has already been completed.[8] Second, in the light of all the public discussion of Science with a capital "S," and the so-called "two cultures," we wondered whether we could isolate any characteristics associated with Science (and Letters) as a totality, rather than characteristics of specific disciplines which make up these broad divisions. The reader should remember that for some variables our crude classification conceals considerable internal variation.

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[8] James A. Davis, op. cit., Chapter VII.

The figures in Table 1.11 provide a first approximation of an answer to our question about the effects of college experience on career choice, for they provide a calculus of the degree of stability and change during college.[9]

From one point of view, the "divisional" preferences appear to be quite stable. There is a very high association between a senior's reported "division" at entrance and graduation for Science, for Letters, and for Letters and Science treated as a totality. In the sense that initial choice tends to remain unchanged during the four years of college, the

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[9]The "freshman" data are retrospective reports of graduating seniors and thus subject to possible distortions of memory. Naturally, we would prefer panel data in which students were followed through their four years of college. Unfortunately, no such data exist for representative samples of college students and none are likely within the next five or ten years. Two years ago NORC submitted a proposal for such a study, but the funds were not granted, and we know of no other plans for such a study on a national basis. Clearly, there are biases resulting from retrospection, but it is not clear as to their extent or direction. It is our feeling that since there are no alternative sources of the data and no hypotheses about direction of bias, it would be mistaken perfectionism to refrain from detailed analyses.

The only empirical data on this question of which we are aware are reported by Alexander Astin in his paper, "Influences on the Student's Motivation to Seek Advanced Training," Journal of Educational Psychology, (1962) 53: 303-9. He presents a comparison of seniors' reported freshman year educational aspirations and their actual freshman reports previously gathered in a panel study of National Merit Scholarship finalists. His results are as follows:

"True" Freshman Year Aspirations

Retrospective Report at Graduation	Bachelor's or Less	Master's	Doctor's Degree	Total	
				Per cent	N
Doctor's . .	12	9	79	100	2,341
Master's . .	44	33	23	100	1,800
BA or Less .	79	14	7	100	1,814

Astin in his discussion stresses the lack of absolute agreement, particularly among those reporting M.A. level aspirations at graduation. However, the relative agreement is very high. If the two measures are dichotomized as Bachelor's or less versus Master's and Doctor's, the Q coefficient of association is .83. Since this value is higher than any of the content correlates we shall report, we may conclude (if data on occupational preference are similar to those on educational aspiration) that the retrospective report has a higher association with the true freshman year report than with any outside variable we have seen.

impact of college experience appears less than might be imagined. Putting it another way, there is no predictor of senior preference among the dozens of items analyzed that has a coefficient as high as that for freshman preference.

TABLE 1.12

ASSOCIATION BETWEEN FRESHMAN AND SENIOR PREFERENCE IN TABLE 1.11 (YULE'S Q)

Dichotomy	Q
Science v. Letters and Other	.93
Letters v. Science and Other	.88
Science and Letters v. Other	.85

Because coefficients of association treat relative percentages rather than absolute percentages (e.g., the relative per cent in Science as seniors among freshmen choosing Science and freshmen choosing other fields), the high Q values are compatible with rather high absolute frequencies of change. Let us then shift to a percentage table presentation of the data in Table 1.11:

TABLE 1.13

SENIOR CHOICE AND FRESHMAN CHOICE

(Per cent Choosing...As Seniors)

Freshman	Senior			Total	
	Science	Letters	Other	Per cent	N
Science	51.9	9.6	38.5	100.0	1,361
Letters	2.2	51.0	46.8	100.0	1,356
Other	4.0	6.2	89.8	100.0	13,800*
			N = ...		16,517*

*Weighted case base.

Viewed in this manner, the stability appears less striking: one-half of the freshmen[10] in Science and half of the freshmen in Letters

[10]The reader should remember that when we use the word "freshman" we mean freshmen who survived to graduate in Spring, 1961. As we have seen, about half of the total freshmen do not graduate at all, and a number graduate at mid-year, the former (but probably not the latter) factor introducing such a bias that our data are far from representative of college freshmen.

shift division by the time of graduation, and 10 per cent of the freshmen in Other switch into Arts and Science career fields by graduation time. The high Q values in Table 1.12 are seen to mean not that a high percentage of freshmen starting in Arts and Science remain, but that freshmen starting in Arts and Science are much more likely to end up there than freshmen with alternative career preferences.

A cursory inspection of the figures might appear to suggest that over the four years of college, the trend is away from Arts and Science fields. Looking at the 10.2 per cent of Other who move into these fields in contrast with the roughly 40 per cent of Arts and Science freshmen who switch to Other, we would gain the impression that four years of exposure to American higher education leads to a net decline in Arts and Science career preference. While this would be the case if the three groups were initially equal in size, net changes depend on initial frequencies as well as percentage changes (technically known as transition probabilities).

Let us examine, instead, a so-called turnover table. We begin by presenting the data in Table 1.11 in another percentage form:

TABLE 1.14

DATA IN TABLE 1.11 PERCENTAGED WITH TOTAL AS BASE

Freshman	Senior			Total Per cent
	Science	Letters	Other	
Science	4.3	0.8	3.2	8.3
Letters	0.2	4.2	3.8	8.2
Other	3.4	5.2	75.0	83.6
Total	7.9	10.2	82.0	100.1
N = ...			16,517*	

*Weighted case base.

Because so many of the students were originally in Other, even their small change rate brings a considerable influx of recruits to Arts and Science, while the high loss rates in Science and Letters

are applied to such small initial bases that the absolute losses are rather small. Let us consider the net results:

TABLE 1.15

NET TURNOVER IN TABLE 1.14

(Entry in Row_i $Column_j$ = Row_j $Column_i$ - Row_i $Column_j$ in Table 2.5)

Freshman	Senior			Total Per cent
	Science	Letters	Other	
Science .		-0.6	+0.2	-0.4
Letters .	+0.6		+1.4	+2.0
Other . .	-0.2	-1.4		-1.6

Table 1.15 shows the net effect of losses and gains which result from student changes in career plans. Consider, for example, the -0.6 in the first row, second column. It was derived as follows: In Table 1.14, we see that 0.2 per cent of the total sample shifted from Letters to Science, while 0.8 shifted from Science to Letters. When we subtract 0.8 from 0.2 the net result of shifts in and out is a loss of -0.6 per cent for Science vis-a-vis Letters. The column headed Total is the sum of the column entries and represents total net gain or loss for the field.

The following conclusions may be drawn from Table 1.15:

1) Over the four years of college, more students shift from Other into Arts and Science than vice versa. This is true for both Science and Letters.

2) Science shows a minuscule net loss during college, but closer inspection reveals net gains vis-a-vis Other and a net loss vis-a-vis Letters.

3) Letters careers show a net gain, over-all, vis-a-vis Science, and vis-a-vis Other.

The results suggest that the three fields form a rank order in terms of net gain, which can be illustrated by rearranging Table 1.15 as follows:

TABLE 1.16

DATA IN TABLE 1.15 REARRANGED TO SHOW PATTERN

Freshman	Senior			Total Per cent
	Letters	Science	Other	
Letters		+0.6	+1.4	+2.0
Science	-0.6		+0.2	-0.4
Other .	-1.4	-0.2		-1.6

In terms of net change then, it appears overly pessimistic to say that the college years show a trend away from careers in Arts and Science. Rather, the data suggest the following formulation:

1) In spite of high loss rates among original freshmen, recruitment to careers in Letters is quite common during college. The result is that Letters careers show a net increase over-all, and vis-a-vis Science and Other individually.

2) When compared with careers outside of Arts and Science, Science fields show a net gain, meaning that during college more students shift from Other into Science than from Science to Other. However, Science shows a net loss to Letters so that by the end of four years, Science careers show a tiny net loss over-all.

3) Although only a small proportion of freshmen choosing a non-Arts and Science career make the shift to Science or Letters, they represent a number sufficient to outweigh the defectors. The result is that over the four years, the other professional fields show net losses to Science and to Letters.

Turnover data are more complex than they appear to be at first glance, and the conclusions drawn will depend on whether one chooses to stress transition probabilities, over-all net changes, or specific net changes. However, our impression is that the total picture may be viewed optimistically by the partisans of Arts and Science. Over the four years of college, career choices in these fields show a net

gain. Furthermore, the fact that Science shows a net loss, which otherwise would produce acute Sputnik hysteria, takes on a new aspect when it is realized that the net loss comes from shifts into Letters, rather than shifts into Other. Even though Science may appear the less successful brother, when compared with Letters, it is important to note that the Arts and Science family prospers as a whole during college.

Let us now shift our attention from the total pattern of changes to the variables associated with change and stability.

C) Factors Associated with Choice of Letters and Science Careers

A Scheme for Analysis

Just as Table 1.11 appeared deceptively simple until we examined it carefully, the tables showing the distributions of various measures in the nine cells of the table provide a fairly complex set of data.

To illustrate, let us look at a rather non-subtle finding. In the questionnaire, each respondent was asked to react to a number of statements about specific occupations (engineer, business executive, research physicist or chemist, etc.). Table 1.17 gives the per cent circling "I don't have the ability to do this kind of work" in regard to "research physicist or chemist."

TABLE 1.17

PER CENT INDICATING "I DON'T HAVE THE ABILITY TO DO THIS KIND OF WORK" FOR "RESEARCH PHYSICIST OR CHEMIST"

Freshman	Senior		
	Science	Letters	Other
Science . . .	13 (696)	50 (129)	41 (508)
Letters . . .	21 (29)	78 (650)	78 (613)
Other	23 (532)	71 (796)	68 (1,168)

N = ... 5,121
NA 245
Total N = ... 5,366

There are 72 possible comparisons among the results for the nine cells of the table, so many that it is necessary to simplify the analysis in order to gain coherence. To begin with we will exclude the Letters to Science cell because its absolute and relative size is too small to justify detailed analysis. Concerning the remaining cells, we can make the following assumptions:

1) A factor is assumed to be related to choice of Science if it consistently differentiates....and these only.

a) Freshmen remaining in Science and Science freshmen shifting into Letters.
b) Freshmen remaining in Science and Science freshmen shifting into Other.
c) Freshmen shifting from Other to Science from freshmen remaining in Other.

2) A factor is assumed to be related to choice of Letters if it consistently differentiates....and these only.

a) Freshmen remaining in Letters from freshmen shifting from Letters to Other.
b) Freshmen shifting from Science to Letters from freshmen remaining in Science.
c) Freshmen shifting from Other to Letters from freshmen remaining in Other.

3) A factor is assumed to be related to choice of Arts and Science if it consistently differentiates....and these only.

a) Freshmen remaining in Science and Science freshmen shifting into Other.
b) Freshmen remaining in Letters and Letters freshmen shifting into Other.
c) Freshmen shifting from Other to Science and freshmen remaining in Other.
d) Freshmen shifting from Other to Letters and freshmen remaining in Letters.

We can illustrate the procedure by showing how the item "I don't have the ability to do this kind of work" for "research physicist or chemist" fits the Science pattern defined above. We begin by calculating Q coefficients of association for the relevant cells.

TABLE 1.18

Q COEFFICIENTS FOR DATA IN TABLE 1.17

Science-Science v. Science-Other	Other-Science v. Other-Other	Science-Science v. Science-Letters	Letters-Letters v. Letters-Other	Other-Letters v. Other-Other
-.65	-.75	-.74	.00	.07

Belief in ability to become a research chemist or physicist clearly fits the "Science" pattern. Perceived lack of ability is associated with shifting out of Science into Other (-.65), out of Science into Letters (-.75) and not shifting into Science from Other (-.74), while at the same time the item does not differentiate in the comparisons involving Letters.

Table 1.19 below shows hypothetical Q coefficients for the Letters pattern and for Arts and Science.

TABLE 1.19

HYPOTHETICAL COEFFICIENTS FOR LETTERS PATTERN AND ARTS AND SCIENCE PATTERN

S-S S-O	O-S O-O	S-S S-L	L-L L-O	O-L O-O	
.00	.00	-.70	+.68	+.69	Hypothetical item positively related to Letters
+.75	+.72	.00	+.68	+.70	Hypothetical item positively related to Arts and Science

Other patterns, of course, can be defined, one associated with change and stability per se regardless of the content area, patterns associated with shifting into but not out of a given field, and so on. We shall note some of these as we proceed.

Since in reality, coefficients of .00 never occur, it is necessary to draw an arbitrary cutting point. We shall say that a coefficient is worth considering only if it has an absolute value of .20 or more,

i.e., if $-.20 < Q < +.20$, we will ignore it, although it is possible that a statistically significant association will be present. In order to emphasize the distinction in subsequent tables, Q's with an absolute value of .20 or more will be circled.

Having reviewed the general trends in stability and change and having set forth a scheme for analyzing correlates of various career decisions, let us now turn to the main problem of this chapter, the relationship of various items to choice of careers in Arts and Science. We shall consider the following clusters of variables: a) Background characteristics, b) Type of undergraduate institution, c) Extra-curricular activities, d) Occupational interests and values, e) Academic experiences. First, we shall examine single items and their relationships, and then we shall turn to the effects of selected sets and combinations of items. At the end we hope to reach two goals: a description of the characteristics which differentiate college seniors who expect to enter Arts and Science careers, and additional insight into the forces which influence decisions during the crucial undergraduate years.

Background Characteristics

The first set of items to be considered--Sex, Socio-economic Status of the parental family, Size of hometown, and Religion "in which you were reared"--have a logical coherence in that they represent the carry-over of relatively permanent pre-college influences. To the extent that sex, original religion and family background items show correlations with decisions during the college years, we can think of college decisions as the unfolding of latent propensities. Furthermore, except for sex, the remaining variables are indices of the major subcultural differences in the United States, and the coefficients tell us the extent to which groups such as lower-class families or small-town people appear to "push" their sons and daughters toward or away from Arts and Science careers.

Table 1.20 shows the Q coefficients between these items and freshman year choice:

TABLE 1.20

BACKGROUND ITEMS AND FRESHMAN CHOICE (Q)

Background Items	Freshman Choice (Q)		
	Science (v. Other)	Letters (v. Other)	Science (v. Letters)
Sex (Male)	.17	-.37	.51
Parental Socio-Economic Status (High)	.08	.24	-.16
Hometown (Size 100,000 or Larger)	-.16	-.14	-.02
Original Religion			
Protestant (v.C&J)	-.14	-.08	.06
Catholic (v.P&J) .	.10	-.03	.13
Jewish (v.C&P) . .	.06	.12	-.06
Self-rated Religiousness (High) . . .	-.25	-.27	.02

Of the 21 possible relationships, only five have a magnitude of .20 or greater. Students originally choosing Letters are less often male when compared with Other (-.37) and Science (.51), that is, Letters freshmen are disproportionately female. In terms of SES (measured here by an index combining father's education, parental family income, and occupation of the head of the household), Letters students are higher than Other (.24), with Science falling in between but not distinctly set apart from the other two. Despite the opinions of many sociologists, there are no associations between original religion and initial choice of Science, Letters, or Other. This does not mean that religion is unimportant, however, for the bottom line of the table tells us that freshmen who reported an initial choice of Arts and Science are somewhat less religious, at least in terms of self-ratings at graduation (Q's = -.25 for Science and -.27 for Letters, when compared with Other).

In sum, background factors do not relate strongly to freshman choices, the only important patterns being that freshmen choosing Letters are disproportionately female, and higher in SES when compared with Other. No differences by size of hometown or original religion turn up.

Now, let us look at the data on change during college.

TABLE 1.21

BACKGROUND ITEMS AND PATTERNS OF CHANGE (Q)

Background Items	Patterns of Change				
	S - S S - O	O - S O - O	S - S L - L	L - L L - O	O - L O - O
Sex (Male) . . .	.19	(.29)	(.32)	.16	-.02
Parental SES (High) . . .	-.18	-.04	(-.30)	.00	(.24)
Hometown (Larger)	.06	-.02	(.33)	.08	.16
Original Religion					
Protestant . .	.02	-.02	(.20)	.02	-.13
Catholic . . .	-.07	-.08	-.10	.00	-.05
Jewish	.00	.00	(-.28)	-.05	.12
Religiousness .	-.09	-.17	(.30)	-.08	(-.40)

Nine of the 35 coefficients are circled, but they do not fall into any of the patterns set forth previously. The closest is Sex, which would fit our Science pattern (consistent coefficients of .20 or greater in the first three columns) if the first Q were .20 instead of .19. Since the rule is arbitrary, we can say that these data document the general impression that Science careers show a masculine trend during college, men being more likely to stay in Science or to enter it from Other. The remaining coefficients turn up mostly in one column--that treating shifts from Science to Letters. We see that such a shift is associated with high SES, larger hometown, being a non-Protestant,

being Jewish, and lesser interest in religion. Of these, parental SES and lesser religiousness, but not hometown or original religion, are also associated with shifting into Letters from Other. However, none of these items is associated with remaining in Letters. If a label were to be pasted on these results, we would suggest that of "urban sophistication," a complex apparently associated with recruitment to Letters, but not with retention of Letters by freshmen, and not associated with Science except for direct losses to Letters.

The spotty patterns and relatively low coefficients (compared with some to be seen in the subsequent sections) suggest that decisions made during college are only slightly affected by the pre-collegiate social backgrounds of the students. This is not to say that family background is not a powerful predictor of who enters college and who graduates among those who enter, nor to deny that family background is associated with aspects of vocational preference within the Science, Letters, and Other groupings. However, among those students who do graduate from college, we may conclude that:

> Except for a sex difference in choice of Science, background variables (specifically parental, SES, original religion, and size of hometown) do not have any consistent, strong relationship with choice of Letters and Science careers during college.

Values and Self-Conceptions

Perhaps the best documented generalization in the study of occupational choice is the strong association between choice of a particular occupation and a person's pattern of interests and values. Because this relationship has been well documented and our data cannot tell us which came first (whether students with given values shifted into a given line of work, or whether students making a particular shift tended to bring their values and self-conceptions into line), our interest is less in the size of the correlations than in the content of the items. That is, while we can take it for granted that values and self-conceptions will show correlations with occupational choices, we are still curious as to which items correlate with which decisions.

We will report on two sets of data, occupational values and self-descriptions. The former provides answers to the question "Which of these characteristics would be very important to you in picking a job or career?" Table 1.22 shows the association between nine of the checklist answers and freshman choice.

TABLE 1.22

OCCUPATIONAL VALUES AND FRESHMAN CHOICE (Q)

Value	Freshman Choice		
	Science (v. Other)	Letters (v. Other)	Science (v. Letters)
Arts and Science Trend			
Opportunities to be original and creative	.22	.36	-.15
Letters Trend			
Making a lot of money . . .	.03	-.21	.24
Living and working in the world of ideas	.14	.37	-.24
Science Trend			
Opportunities to be helpful to others or useful to society	-.23	-.07	-.17
Opportunity to work with people rather than things.	-.38	-.02	-.48
No Trend and Unclassifiable			
Freedom from supervision in my work	.20	.06	.14
Avoiding a high pressure job which takes too much out of you	.14	.07	.07
A chance to exercise leadership	-.19	-.15	-.04
Opportunities for moderate but steady progress rather than the chance of extreme success or failure	-.09	-.21	.12

Only one of the items--"original and creative"--appears consistently to differentiate Arts and Science from the professional fields, freshmen choosing Science or Letters endorsing the item more often than those choosing Other. Checking "world of ideas" and not checking "money" shows a Letters trend, being associated with freshman choice of Letters in contrast to Science and Other. Two items, not checking "helpful to others" or not checking "work with people" show a Science trend, although not all the coefficients meet our criterion of coefficient size. The remaining four items "low pressure," "leadership," "steady progress," and "freedom from supervision") show no consistent pattern.

These coefficients suggest the following interpretations: Whether their original bent is toward Science or Letters, freshmen choosing Arts and Science fields tend to have a higher interest in intellectual achievement, but among Letters choosers we find an additional "academic" bent (interest in world of ideas, disinterest in money) lacking among Science choosers, and among Science choosers we find an asocial tendency (disinterest in people and service) lacking in Letters choosers. Other aspects of job success (steady progress, leadership, freedom from supervision and concern about high pressure) do not consistently distinguish either Letters or Science choosers from other students.

Now let us see whether decisions during college reinforce or reduce these original differences.

TABLE 1.23

OCCUPATIONAL VALUES AND PATTERNS OF CHANGE (Q)

Value	S-S S-O	O-S O-O	S-S L-L	L-L L-O	O-L O-O
Arts and Science Trend					
Original and creative . . .	.36	.20	-.19	.25	.39
Leadership	.41	.28	-.13	.28	.21
Letters Trend					
Money	-.08	.08	.18	-.24	-.32
Steady progress	.00	.06	.23	-.20	-.24
Science Trend					
Helpful to others	-.24	-.25	-.44	-.13	.07
Work with people	-.73	-.71	-.68	-.32	-.14
Letters-Science-Other					
World of ideas	.28	.24	-.34	.28	.54
Unclassifiable					
Avoid high pressure	.04	.26	-.26	.07	.07
Freedom from supervision .	.05	.06	.11	.09	.28

In general, shifts during the four years of college tend to accentuate original value differences, although some exceptions occur. In particular, not endorsing "A chance to exercise leadership" is more closely associated with Arts and Science choices during college than at the outset.

One way of summarizing the results is as follows: If we divide the values into those accepted versus those rejected by Arts and Science choosers, we can say this:

1) Intellectualism and intellectual achievement are the only positive values accepted by students choosing Arts and Science fields; they are otherwise differentiated in their rejection of the remaining values. Thus, "Original and creative" differentiates Arts and Science choosers at entry and in terms of changes, and "Living and working in the world of ideas" shows an ordered pattern, Letters choosers being highest, Science choosers being somewhat lower, and Others being lower than either.

2) The differences between students choosing Science and those choosing Letters tend to be in terms of which occupational values they reject, rather than which ones they accept, although both eschew leadership. Science choosers tend to be particularly disinterested in the "service" values of working with people or being useful or helpful to society, although Letters choosers show some trends in this direction. Letters choosers, on the other hand, tend to be especially disinterested in money and security.

Putting it another way, while one might anticipate that students interested in the Letters and Science fields might be distinguished by an interest in security (e.g., the comfort of academic tenure versus the risk of competitive business) or an altruistic motivation to find a career of service, it appears that what best characterizes these young people is a strong intellectual bent and a disinterest in other occupational values.

Our second set of data, students' self-descriptions, will supplement these findings. The question was worded as follows: "Listed below are some adjectives, some of which are favorable, some of which are unfavorable, some of which are neither. Please circle the ones which best describe you." No claim is made that those students circling "Witty" would be found so by an objective observer or that those checking "Good looking" would do well in a beauty contest, but the data provide an insight into how the students see themselves.

To begin with, of the 26 adjectives analyzed, twelve show no association with freshman choice or with shifts during college. Adjectives with no Q coefficients of .20 or greater for either analysis are Ambitious, Calm, Cautious, Easygoing, Energetic, Good looking, Hard driving, Methodical, Middle brow, Obliging, Reserved, and Witty.

Table 1.24 summarizes the associations with freshman choice for those adjectives with at least one coefficient of .20 or above.

TABLE 1.24

ADJECTIVE SELF-DESCRIPTIONS AND FRESHMAN CHOICE (Q)

Adjective	Science (v. Other)	Letters (v. Other)	Science (v. Letters)
Letters and Science Trend			
Cooperative	-.22	-.20	-.02
Intellectual	.31	.36	-.05
Letters Trend			
Cultured	-.03	.38	-.41
Science v. Letters			
Dominant	-.10	.13	-.23
Outgoing	-.18	.15	-.32
Poised	-.18	.13	-.30
Talkative	-.18	.07	-.25
Letters v. Other			
Athletic	-.12	-.30	-.19
High strung	-.09	.23	-.15
Idealistic	-.14	.28	-.08

Not many relationships appear, and the results show an interesting trend. Only two items (Cooperative and Intellectual) are associated with freshman choice of both Science and Letters in contrast with Other, and no item is associated with choice of Science versus Letters and Other. Putting it another way, the adjectives tend to distinguish only Letters students. Thus, Letters choosers are differentiated from both Science and Other by Cultured,' distinguished from scientists by Dominant, Outgoing, Poised, and Talkative (perhaps what psychologists call "Social Ascendency") and distinguished from Other ' by Idealistic, High strung, and (Not) Athletic.

Before noting the implications, let us examine the change data:

TABLE 1.25

ADJECTIVE SELF-DESCRIPTIONS AND PATTERNS OF CHANGE (Q)

Adjective	S-S S-O	O-S O-O	S-S L-L	L-L L-O	O-L O-O
Letters Trend					
Cultured	-.03	-.18	-.32	.27	.43
Intellectual	.14	.25	-.39	.32	.46
Unclassifiable					
Cooperative	-.08	-.19	-.14	-.08	-.23
Dominant	-.26	-.05	-.22	.19	.20
Fun loving	-.06	-.10	.33	-.08	-.16
Happy	-.02	-.10	.25	-.12	-.35
High strung	-.04	.08	-.07	.22	.28
Idealistic	-.08	.09	-.32	.10	.36
Moody	-.05	.11	-.24	.14	.30
Poised	-.16	-.33	-.16	-.05	.12
Quiet	.07	.12	.34	-.06	-.11
Talkative	-.14	-.12	-.26	-.02	-.02

The pattern is similar, all but three of the associations involving the Letters students, particularly those who shift into Letters during college. As in the case of "World of ideas" versus "Original and creative," we see a high-brow proclivity among the Letters choosers (who see themselves as more often "Cultured" and "Intellectual" compared with either Science or Other choosers). A slightly different theme appears in the items which distinguish those who shift into Letters from either Science or Other. They tend to describe themselves as: Dominant, Not happy, Idealistic, and Moody, and to a lesser extent not Cooperative and Not fun loving. If one had to summarize all these disparate trends, one could think of the major pattern as being a tendency for students attracted to Letters fields to consider themselves psychologically complex.

More important, perhaps, than the positive findings, is the relatively lower strength of the associations for the adjectives than for the occupational values. The adjectives show some interesting differences, but on the whole the Q's are lower and the results are less likely to fall into our analytical patterns.

In sum, concerning their interests, occupational values, and self-descriptions, the most important trend is a high interest in intellectual achievement among those students attracted to Arts and Science fields, with Letters recruits being characterized in addition by a "high-brow" self-image and a disdain for worldly rewards, while Science recruits are particularly likely to have a low interest in people and social welfare.

Non-Classroom Academic Characteristics

Having reviewed the relationships for background characteristics, occupational values, and self-defined personality characteristics (and having seen that, of these, intellectual orientations appear to be the most important), we shall turn to the major concern of this chapter, the effects of college experience on career choices of the seniors. For convenience, college experience variables will be divided into those

outside the actual classroom experience, and those directly concerned with events involving grades, teachers, and course content.

Under the heading "Non-Classroom" variables we shall consider the kind of school attended and extra-curricular activities such as sports, drama groups, and fraternities. Table 1.26 gives the associations between freshman choice and selected institutional characteristics of the students' undergraduate institutions.

TABLE 1.26

SCHOOL CHARACTERISTICS AND FRESHMAN CHOICE (Q)

School Characteristics	Science (v. Other)	Letters (v. Other)	Science (v. Letters)
Quality Level (I & II v. III & IV)	.32	.20	.13
Control (Public)	-.22	-.16	-.06
Size (Graduating Class of 500 or More v. Smaller)	.06	.14	.06
Region of the Institution			
Northeast (v. All Other)	.19	.07	.13
North Central (v. All Other)	-.07	-.02	-.05
West (v. All Other) .	-.12	-.12	.00
South (v. All Other) .	-.14	.03	-.16

Only one of the school characteristics shows a definite trend: School Quality, as measured by the average IQ of freshmen at the institution,[11] is associated with initial choice of Arts and Science fields. This is to say that the more selective institutions recruit a higher percentage of freshmen aiming for careers in Science or Letters, while in the less selective institutions, a higher per cent

[11] Cf. James A. Davis, Great Aspirations, Volume I.

of freshmen opt for careers in professional fields. Beyond this, control, size, and region make little or no difference, saving a borderline trend for public institutions to have fewer Arts and Science choosers, undoubtedly because they are less often strictly Liberal Arts institutions.

Table 1.27 reports the shift data for these same school variables:

TABLE 1.27

SCHOOL CHARACTERISTICS AND PATTERNS OF CHANGE (Q)

School Characteristics	S-S S-O O-S O-O	O-S O-O	S-S L-L	L-L L-O	O-L O-O
Quality Level	-.03	-.05	(-.34)	.14	(.26)
Control	-.08	-.02	.11	-.12	-.18
Size	-.06	-.18	-.15	-.10	-.14
Region					
Northeast	.08	.04	-.08	-.17	-.11
North Central	.02	-.10	-.10	-.02	.00
West	-.04	-.04	-.04	-.18	-.08
South	-.17	.09	(.47)	-.06	-.06

Having already seen a number of low associations, the figures in Table 1.27 may not appear surprising, but they are actually quite significant. Only three of the coefficients are of .20 or above and none fit our patterns. The closest to a trend is for shifts into Letters careers from either Letters or Other to be more common in the high-quality institutions. However, the other negative findings on quality are equally impressive. Despite the fact that the schools classified into quality levels I and II represent the nation's most famous and most selective schools, with the most distinguished faculties, most challenging curricula, and most extensive laboratories, these top schools are no more likely and no less likely to influence their students toward Science

and no more likely to "hold" their original Letters recruits than schools much lower in fame and fortune. Similarly, Control, Size, and Region, which are known to be associated with considerable differences in the academic milieu of undergraduate institutions appear to play no role in the decision process. Considering both the popular belief that college has a tremendous effect on young people and the voluminous literature on "Ph.D. productivity" (which seldom controls for the in-put in terms of preference of freshmen), these negative findings are a matter of considerable surprise. Before this chapter is concluded, however, we shall be able to produce a set of findings which cast considerable light on the matter.

Having noted that institutional characteristics show surprisingly small effects, let us turn to the oft-discussed question of extracurricular activities. As might be expected, freshmen with different career plans vary in their extracurricular interests, as shown below in terms of answers to the question, "In which of the following have you been an active participant at this school?"

TABLE 1.28

FRESHMAN CHOICE AND EXTRACURRICULAR ACTIVITIES (Q)

Extracurricular Activities	Science (v. Other)	Letters (v. Other)	Science (v. Letters)
Letters Trend			
Editorial Staff and Campus Publications	.12	(.37)	(-.27)
Musical or Dramatic Group.	-.03	(.37)	(-.40)
Campus group concerned with national or world issues	.05	(.34)	(-.29)
Intercollegiate (varsity) Athletics	.08	-.15	(.23)
No Trend			
Fraternity, Sorority (or equivalent)	-.06	-.13	.07
Special interest group (e.g., Psychology club, Outing Club)	.10	-.08	.18
Student Government	.00	.00	.00

Freshmen aiming for careers in Letters are considerably more likely to become involved in campus publications, musical or dramatic groups, and campus groups concerned with national and world issues, while they are somewhat less likely to become involved in varsity athletics (possibly because they are more often women). Despite what might appear to be an antisocial cast to their occupational values, freshmen choosing Science are no less likely to become involved in activities than freshmen in Other.

The coefficients for patterns of change tell us how closely exposure to the influence of various activities is associated with career decisions during undergraduate studies.

TABLE 1.29

EXTRACURRICULAR ACTIVITIES AND PATTERNS OF CHANGE

Extracurricular Activities	S-S S-O	O-S O-O	S-S L-L	L-L L-O	O-L O-O
Campus group concerned with national or world issues . .	(-.26)	.05	(-.43)	.03	(.48)
Editorial Staff of Campus Publications	-.17	-.07	(-.34)	.15	(.43)
Musical or Drama Groups . . .	-.04	-.10	(-.49)	.09	(.29)
Fraternity or Sorority	-.17	-.02	.12	-.02	-.15
Student Government	-.14	-.04	-.07	.10	.16
Varsity Athletics	.04	.00	.12	.00	-.12
Special Interest Group	.12	.12	.12	.02	.00

While the circled relationships do not fit our paradigm for field influences, the activities which originally attract Letters recruits tend to show a pull in that direction, albeit only for students beginning in Science or Other. In the case of issue groups, publications, and music and drama groups, participation is associated with shifts into Letters for freshmen originally choosing Other or Science, but is not associated

with greater retention of original Letters freshmen. In addition, participation in an issue group is associated with shifting from Science to Other. Equally interesting is the fact that the student activities most condemned by campus observers--fraternities, varsity athletics, and student government--show no associations at all.

In sum, it appears that campus activities with a Letters flavor do act as a channel for recruiting students to Letters careers, although participation in them does not appear to reinforce original preferences for Letters.

To summarize our data on non-classroom academic variables, we found surprisingly low relationships except for two items associated with shifting into Letters from an initial choice of Science or Other. Both high quality in terms of institution and involvement in extracurricular activities with a Letters flavor are associated with recruitment to Letters careers, although not with the rate of defection among freshmen originally opting for Letters occupations. From the viewpoint of those concerned with recruitment to Science, it should be noted that no activity or school characteristic shows a consistent trend toward or away from Science. However, high-quality institutions initially recruit a disproportionate share of students interested in Science, and freshman scientists who become involved in "issue" groups are likely to shift into Letters or Other at the time of graduation.

Classroom Experiences

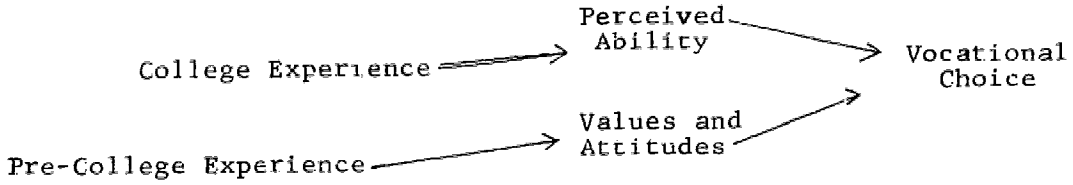
In searching for variables to explain the impact of college experience, social scientists have tended to pay surprisingly little attention to the events which transpire in that other 50-minute hour, the college class period. Considerable attention has been given to structural types of college (e.g., Liberal Arts colleges versus universities), to undergraduate value subcultures, to fraternities and athletics, and to undergraduates' psychodynamics, while little systematic attention has been paid to the consequences of experiences in particular courses.

Part of this emphasis comes from a search for subtle rather than "obvious" factors, but part also perhaps comes from the fact that college experience studies have tended to consider the dependent variables as affective rather than cognitive phenomena. Generally speaking, researchers involved in studies of undergraduate experience have assumed that the key effects of college are (or should be) changes in values, attitudes, and personality characteristics, rather than changes in beliefs or factual knowledge. Because a large body of studies in and out of college classes suggest that formal educational experiences have a rather low impact on attitudes, opinions, and personality characteristics, it is only natural to seek elsewhere for explanations. Given the well-demonstrated correlation between values and occupational choices, research workers have been focusing heavily on the following chain of relationships:

College Experiences → {Attitudes and Values} → Career Choices

The results of our analyses, however, have led us to take a slightly different tack. Granted that young people gravitate toward occupations which (they believe) will satisfy particular value preferences (making money, working with people, being original and creative, etc.), career choice also involves a series of crucial decisions about one's own ability. In casting about for a line of work, young people must ask themselves not only "Would I like the work?" but also "Would I be good at it?" In reality the two are intertwined, for one can hardly expect to excel in a field one dislikes, but it is entirely possible to believe that being an opera singer would be immensely gratifying and also to realize that one has very low musical aptitude. When, in addition, we remember that the professional occupations--which have been shown to be the vocational destinies of most seniors--are quite selective and generally require advanced study, it seems plausible to consider the idea that the main function of college experience in vocational choice is to affect the student's judgment of his ability, rather than his personality or value preferences.

The model we shall consider looks like this:



While the dependent variable is "cognitive" in the sense that we are looking for factors related to the students' beliefs about their capacities to succeed in various occupations, it must be stressed that this does not mean that the process is "rational." Indeed, one of the main lines of theory in contemporary Social Psychology, characterized by such tags as "reference group theories" and "social comparison theories," implies that cognitive judgments are strongly affected by social and personality factors, and this will be our conclusion too.

It must be stressed that survey data of the type considered here can hardly provide definitive evidence for choosing between such abstract formulations, but it is our belief that the broad sweep of the evidence supports the idea that the cognitive model has much to offer.

The key data come from the following question:

40. Listed below are some college courses which you might have taken. Please circle the number of any statements which describe your reactions. (Circle any which apply in each row. If none apply, leave the row blank.)

	(15) 9	(16) 9	(17) 9	(18) 9	(19) 9
	Course or Area				
	Physics, Chemistry	Mathematics	Biology, Zoology, Botany	Social Sciences	English
I took one or more courses in this field or area during college	X	X	X	X	X
I didn't take any courses in this field or area during college	0	0	0	0	0
I found this course content very interesting	1	1	1	1	1
I found this course content very dull .	2	2	2	2	2
I have a flair for course work in this area	3	3	3	3	3
I found this area rough going academically	4	4	4	4	4
Teachers in this area encouraged me to go on in the field	5	5	5	5	5
I admire many of the teachers in this area as persons not just as professors . .	6	6	6	6	6
By and large, the teachers in this area are not the kind of person I'd like to be	7	7	7	7	7
One or more of my close friends is majoring in this	8	8	8	8	8

The item was designed to compress a considerable amount of information into a rather small package, and the distributions are more meaningful when the responses are organized into separate indices.[12]

The first index is that of exposure, the per cent checking "I took one or more courses in this field or area during college" divided by the total checking that item or "I didn't take any courses in this field or area during college."

TABLE 1.30

PER CENT TAKING ONE OR MORE COURSES

Course	Total		NA
	Per cent	N	
Letters			
English	99	3,266	131
Social Sciences	97	3,241	156
Science			
Mathematics	74	3,204	193
Physics, Chemistry	65	3,229	168
Biology, Zoology, Botany .	63	3,204	193

Even though many critics have deplored the rampant vocationalism of American higher education, it is very rare for students to totally escape Letters and Science courses. Virtually all students report an English course and one or more Social Science courses. Because the Natural Science courses are presented in finer detail their percentages run somewhat lower, but it will be shown that 97 per cent of the sample report one or more of the three Science courses listed in the question. Thus, for all practical purposes, every college graduate may be assumed to have some exposure to Letters and to Science during his undergraduate training.

[12] We shall not report data on "One of my close friends is majoring in this," although it tends to show the same sorts of statistical patterns as the other course reaction items.

A second index of reactions to course content may be constructed from the responses, "I found this course content very interesting" and "I found this course content very dull." If we assume that those who checked a course but did not check either of these two responses belong in an intermediate category, the following distributions appear:

TABLE 1.31

REACTIONS TO CONTENT AMONG THOSE INDICATING THAT THEY TOOK ONE OR MORE COURSES

Reaction to Content	Mathematics	English	Physics, Chemistry	Biology, Zoology, Botany	Social Sciences
Very interesting	47	53	56	64	68
Intermediate* .	32	28	28	24	19
Very Dull . . .	21	19	16	12	13
Total . .	100%	100%	100%	100%	100%
N Taking one or more courses	(2,367)	(3,235)	(2,088)	(2,149)	(3,121)

*Intermediate = 100 per cent minus total for Very Interesting plus Very Dull.

There is a steady progression, more in "Very Interesting" than in "Dull," from Mathematics to Social Sciences, with 68 per cent of the students who took courses in Social Science reporting them as "Very Interesting" in comparison with 47 per cent for Mathematics.

A similar approach enables us to produce an index of "Reported Difficulty" from the responses, "I have a flair for course work in this area," and "I found this area rough going academically."

The progression for "Difficulty" is similar, but not identical. It is true that the fact that Social Sciences are rated as so interesting may not be independent of the fact that only six per cent found them "rough going," but differences in other fields tend to negate this. Thus,

while Physics and Chemistry are rated as more interesting than Mathematics, they are also rated as "rough going" somewhat more often. Similarly, English moves up in the ranking on "Difficulty" in comparison with the ranking on Interest. Putting it another way, Physics and Chemistry are rated as somewhat more "Interesting" than one would expect from their difficulty, while English is rated as somewhat less interesting than one would expect from its reported difficulty.

TABLE 1.32

REPORTED DIFFICULTY

Difficulty	Physics, Chemistry	Mathematics	Biology, Zoology, Botany	English	Social Sciences
Have a flair	21	26	24	26	34
Intermediate* . . .	35	38	56	58	60
Rough going	44	36	20	16	6
Total . . .	100%	100%	100%	100%	100%
N Taking one or more courses . .	(2,088)	(2,367)	(2,149)	(3,235)	(3,121)

*Intermediate = 100 per cent minus total for "Have a flair" and "Rough going."

In addition to Content Reactions and Difficulty, two indices were constructed for the area of faculty relationships. Because a number of studies of professional scientists indicate that persons who do enter Science fields frequently cite the influence of their undergraduate teachers as a factor in their career decisions, faculty influence appeared to be a potentially important variable. Furthermore, it is one of the few items in the entire set of data which (in theory at least) is amenable to deliberate change. Our questions were designed to tap two slightly different types of influence--encouragement and identification. By encouragement we mean students' reports of direct influence attempts, as

measured by the response, "Teachers in this area encouraged me to go on in the field." It is also possible that faculty members influence their students less overtly, through serving as a "role model" or hero. Conceivably, a faculty member who makes no direct influence attempts but who is greatly admired can be more influential than a faculty member who proselytizes relentlessly but is disliked by his "targets." The items "I admire many of the teachers in this area as persons, not just as professors" and "By and large, the teachers in this area are not the kind of persons I'd like to be," were combined as the Identification Index.

TABLE 1.33

FACULTY RELATIONS INDICES

Indices	Mathematics	Physics, Chemistry	English	Biology, Zoology, Botany	Social Sciences
Identification					
Admire as Persons	28	35	40	39	48
Intermediate* . .	55	47	44	50	44
Not the kind.....	17	18	16	11	8
Total . . .	100%	100%	100%	100%	100%
Encouragement ("Teachers in this area encouraged...")	12	14	15	15	22
N Taking one or more courses . .	(2,367)	(2,088)	(3,235)	(2,149)	(3,121)

*Intermediate = 100 per cent minus total for Admire and Not the Kind.

The two Faculty relationship indices show congruent rank orders, with the sociable Social Science teachers receiving the most favorable ranking on both Identification and Encouragement.

The results for the five course areas may be summarized by expressing the percentages as deviations from the average per cent for the

five fields, with negative content ratings reversed so that a positive sign for the difference means a more favorable standing for the course.

Field	Item						
	Very Interesting	Very Dull	Flair	Rough Going	Admire	Not the Kind	Encouraged
Social Sciences	+ 10	+ 3	+ 8	+ 10	+ 10	+ 6	+ 6
Biology, Zoology, Botany	+ 6	+ 4	- 2	0	+ 1	+ 3	- 1
English	- 5	- 3	0	0	+ 2	- 2	- 1
Physics, Chemistry	- 2	0	- 5	- 20	- 3	- 4	- 2
Mathematics . . .	- 11	- 5	0	- 12	- 10	- 3	- 4

Only one field, Social Sciences, has all favorable signs, being given more favorable ratings on each aspect. While no field has all negative signs, Mathematics and Physics-Chemistry have no positive signs and all but two negative signs, their reaction ratings being quite consistently less favorable. The Biological Sciences and English fall in between, Biological Sciences being rated relatively favorably in terms of content but not in the other dimensions; English is rated somewhat less favorably in terms of content but not too differently in the other dimensions.

The cynic may well remark that the order in the summary is very much akin to the reputed order in terms of intrinsic intellectual challenge, with Mathematics and Social Sciences lying at opposite poles in the generality of undergraduate institutions. We are in no position to deny this, but it is important to note that, whatever the reasons, courses do vary in the favorability of student reactions.

In order to simplify the materials and to allow for the fact that Science courses were broken down in more detail than Letters courses, combined indices for Science and for Letters were constructed. For

Science "any one" means giving a particular response to any one of the three Science fields, for Letters it means giving the response to either Social Sciences or English.

TABLE 1.34

COURSE REACTION INDICES AND DISTRIBUTIONS

Index	Definition	Distributions	
		Science	Letters
Exposure	Yes = Yes to any one	97	100
	No = No to all	3	0
	Total	100%	100%
Reaction to Content	Favorable = "Very Interesting" on one or more and not "Very Dull" for any	55	64
	Less Favorable = All Other	45	36
	Total	100%	100%
Reported Difficulty	High = "Rough going" on one or more, and not "Flair" on any	35	12
	Low = All Other	65	88
	Total	100%	100%
Faculty Identification	High = "I admire" on one or more and not "By and large..." on any	35	52
	Low = All Other	65	48
	Total	100%	100%
Perceived Faculty Encouragement	High = "Teachers in this area" on one or more	22	33
	Low = "Teachers in this area" not circled for any	78	67
	Total	100%	100%
	N =	15,050*	15,702*
	+NA	1,467*	815*
	Total N =	16,517*	16,517*

*Weighted case base.

+NA on Science is defined as having no check in any of the three columns and/or checking neither X nor O in any of the three columns. NA on Letters is defined similarly, i.e., blanks were not defined as NA unless the student left the entire set of columns blank or did not respond to the question regarding whether he took a course in the set.

When the specific questions are pooled to produce global indices for Science and Letters, almost 100 per cent exposure is found for both of the Arts and Science divisions, all but a handful checking one or more courses in each of the areas. The results for the two indices are not directly comparable (one has no idea how the Letters index would have come out if specific Social Science courses or other Humanities courses were added, or how Science would have been affected by lumping together the Physical and Biological Sciences) but one suspects that Letters courses have a somewhat more favorable image, having higher percentages on Favorable Reaction to Content, Faculty Identification, and Faculty Encouragement, along with lower percentages on Reported Difficulty.

While Table 1.34 gives the total distributions on these indices, one would expect students with different freshman career preferences to report different course reactions. Table 1.35 shows associations with freshman choice. In addition, we have included two measures of academic performance--the student's reported cumulative grade point average (GPA), and the Academic Performance Index (API). In the latter, the raw GPA is corrected to take note of the standing of the school (based on the relative intellectual calibre of its students).[13]

TABLE 1.35
CLASSROOM EXPERIENCES AND FRESHMAN CHOICE (Q)

Classroom Experiences	Science (v. Other)	Letters (v. Other)	Science (v. Letters)
Arts and Science Trend			
Grade Point Average (≥ B+)	.26	.26	.00
API Index (Top Fifth in Distribution) .	.33	.29	.05
Science Trend			
Difficulty (Science - Low)	.33	-.18	.48
Faculty Identification (Science) . . .	.22	-.19	.40
Science-Other-Letters			
Encouragement (Science - Low)	-.64	.36	-.82
Encouragement (Letters)	-.20	.41	-.56
Reaction to Content (Science - Less Favorable)	-.40	.20	-.56
Reaction to Content (Letters - Favorable)	-.22	.28	-.48
Letter. Trend			
Difficulty (Letters - Low)	-.17	.36	-.50
Faculty Identification (Letters) . . .	-.16	.24	-.39

[13] Cf. James A. Davis, Great Aspirations, Volume I.

Freshmen interested in Arts and Science careers tend to end up with higher grade point averages, although there is no difference between those interested in Letters and those oriented to Science. As might be expected, those with a freshman preference for Science report more favorable reactions to Science courses and less favorable reactions to Letters courses, the reverse being true for freshmen choosing Letters career fields.

Table 1.36 shows the associations with change patterns for these same items

TABLE 1.36

CLASSROOM EXPERIENCES AND PATTERNS OF CHANGE

Classroom Experiences	S-S S-O	O-S O-O	S-S L-L	L-L L-O	O-L O-O
Arts and Science Trend					
GPA	.38	.34	.07	.31	.38
Science Trend					
Encouragement (Science)	.51	.77	.68	-.22	.07
Difficulty (Science - Low)	.50	.57	.69	.18	.18
Identification (Science - Low)	.39	.52	.61	.10	-.09
Content (Science - Favorable)	.36	.55	.40	-.08	-.16
Science-Other-Letters					
API (Top Fifth)	.33	.32	.23	.25	.44
Letters v. Science					
Encouragement (Letters)	-.62	-.47	-.88	.00	.58
Identification (Letters)	-.39	-.30	-.65	.02	.40
Difficulty (Letters - Low)	-.25	-.26	-.59	.00	.44
Content (Letters - Favorable)	-.22	-.35	-.50	-.08	.33

A number of findings can be extracted from the table.

Only one of the measures shows a trend toward Arts and Sciences across the board: the student's cumulative grade point average. The student with higher grades is more likely to remain in Science, to enter Science from a freshman choice of Other, to remain in Letters, or to

shift into Letters from a freshman choice of Other, GPA is unrelated to shifting from Science to Letters. It is interesting to compare the results for GPA with those for API. We remember that the higher quality schools showed a trend toward shifting into Letters, although no other decision trend. Since the API index amounts to weighting raw GPA by school quality, the API measure of academic performance shows those students shifting from Science to Letters as higher in performance than those remaining in Science. Putting these same results in slightly different words:

The choice patterns of the superior academic performers can be broken down into two separate components. The first is a tendency for students who do relatively well by the standards of their schools to remain in or be recruited to careers in Science or Letters. The second is a tendency for the schools which are most selective to show a pattern of shifting into Letters from Other and Science. Thus, the student who is "destined" to do well in college has a greater chance of ending up in an Arts and Science field regardless of the school he attends, but since the potentially high performer is considerably more likely to attend a school which exercises some pull toward Letters careers, he is somewhat more likely to end up in a Letters career than a Science career.

The four indices of reaction to Science show the Science trend defined at the beginning of this chapter. For Encouragement, Difficulty, Identification, and Content, Table 1.36 shows that those with the more favorable reactions are considerably more likely to remain in Science or to shift into Science from Other. Thus, the best single correlate of choice of a Science career during the college years is a favorable reaction to Science courses and Science faculty.

When we turn to the Letters indices, however, the converse is not true. The Letters indices do show strong effects, but they are not a simple pull toward Letters careers. Indeed, the four indices show no zero order association with remaining in Letters for freshmen oriented toward these occupations! Rather, the Letters indices are associated

with defecting from Science to Other, and recruitment to Letters of those leaving Science and Other.

An additional theme in the table lends some weight to our speculations about cognitive factors (more preceisely, we set forth the cognitive interpretation on the basis of this and following tables). For both Science and Letters it is seen that Faculty Encouragement shows higher correlations than Faculty Identification, and in all but one comparison the Difficulty indices show stronger relationships than the Content indices. That is, doing well in a course tends show a stronger relationship than simply liking it; and to be told one is doing well has stronger correlations than simply liking the teller. In particular, the Faculty Encouragement index shows very strong relationships across the board.

The importance of course reactions, and the particular importance of cognitive variables among the course reactions may be seen by listing, from all the tables reported so far, the strongest correlates for each type of decision.

TABLE 1.37

SUMMARY OF MAJOR ZERO ORDER CORRELATES (10 HIGHEST Q COEFFICIENTS OF .20 OR MORE

		Per cent
A.	Items distinguishing between (Science - Science) and (Science - Letters)	
(1)	Teachers in this area (Letters) encouraged me to go on in the field	(-.88)
(2)	I found this area (Science) rough going academically . . .	(-.69)
*3.	Opportunity to work with people rather than things	(-.68)
(4)	Teachers in this area (Science) encouraged me to go on in the field	(.68)
*5.	I admire many of the teachers in this area (Letters) as persons not just as professors	(-.65)
*6.	I admire many of the teachers in this area (Science) as persons not just as professors	(.61)
(7)	I found this area (Letters) rough going academically . . .	(-.59)
(8)	I found this course content (Letters) very interesting . .	(-.50)
9.	Active participant in Musical or Dramatic group	(-.49)
10.	School located in South	(-.47)

* = Value or Interest measure.

(◯) = Ability measure.

TABLE 1.37--Continued

		Per cent
B.	Items distinguishing between (Science - Science) and Science - Other)	
*1.	Opportunity to work with people rather than things	(-.73)
(2.)	Teachers in this area (Letters) encouraged me to go on in the field	(-.62)
(3.)	Teachers in this area (Science) encouraged me to go on in this field	(.51)
(4.)	I found this area (Science) rough going academically	(-.50)
*5.	A chance to exercise leadership	(-.49)
*6.	I admire many of the teachers in this area (Letters) as persons not just as professors	(-.39)
*7.	I admire many of the teachers in this area (Science) as persons not just as professors	(.39)
(8.)	Cumulative grade point average of B+ or higher	(.38)
*9.	I found this course content (Science) interesting	(.36)
*10.	Opportunities to be original and creative	(.36)
C.	Items distinguishing between (Letters - Letters) and (Letters - Other)	
*1.	Intellectual	(.32)
*2.	Opportunity to work with people rather than things	(-.32)
(3.)	Grade point average of B+ or better	(.31)
*4.	Living and working in the world of ideas	(.28)
*5.	A chance to exercise leadership	(-.28)
*6.	Cultured	(.27)
*7.	Opportunities to be original and creative	(.25)
*8.	Making a lot of money	(-.24)
*9.	Opportunities for moderate but steady progress rather than the chance of extreme success or failure	(-.22)
(10.)	Teachers in this area (Science) encouraged me to go on in the field	(.22)
D.	Items distinguishing between (Other - Science) and (Other - Other)	
(1.)	Teachers in this area (Science) encouraged me to go on in the field	(.77)
*2.	Opportunity to work with people rather than things	(-.71)
(3.)	I found this area (Science) rough going academically	(-.57)
*4.	I found this course content (Science) very interesting	(.55)
*5.	I admire many of the teachers in this area (Science) as persons not just as professors	(.52)
(6.)	Teachers in this area (Letters) encouraged me to go on in the field	(-.47)
*7.	I found this course content (Letters) interesting	(-.35)
(8.)	Grade point average of B+ or better	(.34)
*9.	Poised	(-.33)
*10.	I admire many of the teachers in this area (Letters) as persons not just as professors	(-.30)

TABLE 1.37--Continued

		Per cent
E.	Items distinguishing between (Other - Letters) and (Other - Other)	
(1)	Teachers in this area (Letters) encouraged me to go on in the field	(.58)
*2.	Living and working in the world of ideas	(.54)
3.	Active participant in Campus group concerned with national or world issues	(.48)
*4.	Intellectual	(.46)
(5)	I found this area (Letters) rough going academically	(-.44)
6.	Editorial staff of Campus publication	(.43)
*7.	Cultured	(.43)
*8.	I admire many of the teachers in this area as persons not just as professors	(.40)
*9.	Self-description of Very or Fairly "Religious"	(-.40)
*10.	Opportunities to be original and creative	(.39)

A rough content analysis of these materials may be made by dividing the measures into three groups: a) Measures of value or interest--occupational values, Content Reaction, Faculty Identification, Religiosity, and certain adjectives; b) measures of perceived ability--GPA, Difficulty, Faculty Encouragement; c) All Other.

The results seem clear. The variables most predictive of career decisions during college are values and measures of perceived ability. Of the leading correlates, 36 out of 40 fall into one or the other classification. If, then, one is willing to grant that college experience has relatively less impact on values than on judgments of ability, then Table 1.37 goes a long way toward justifying the cognitive model set forth previously.

The Relativity of Ability Judgments

The proposition that judgments of ability play a large role in vocational choice during college appears to be a truism until one asks how college students arrive at these judgments. To begin with, a vast array of psychological studies indicate that judging one's self is a

notoriously difficult task. In particular, the nature of occupational choice is such that college undergraduates must make crucial decisions about their abilities with rather scanty evidence. A student can judge his ability to drive a car, put the shot, or impress the opposite sex on the basis of his previous success in these activities, but in the occupations which attract college graduates practical experience is rare. In fact, it is peculiarly characteristic of the professional occupations that one cannot gain any practical experience at all until after one has made sufficient commitment to embark upon advanced training. Medicine is a prime example, but it is also true that future teachers, engineers, scientists, architects and lawyers have little or no opportunity to gain practical experience prior to making a decision to enter the field. Our view is that in such a situation college courses provide an analogue to practical experience. Whether or not one's experiences in freshman Chemistry are a reasonable analogue to the experiences one would have as a professional chemist, they are about the only experiences available to the student and thus apparently have a strong influence on his decisions.

This is not the only role of college experience, however, for it appears that undergraduate studies also provide standards of comparison. Two such standards may be deduced from the data analyzed. To begin with, it appears that reactions to one course may serve as a standard or frame of reference for assessing other courses. Consider, for example, a Science-prone freshman who "does well" in his Science courses but even better in a non-Science course. One could argue that this will reinforce his Science choice since it provides confirmation of his belief that he is capable of academic success. It will be shown, however, that the effect of success in non-Science courses is to divert students from the choice of Science. That is, <u>it appears that the students are pulled toward the fields in which they are doing relatively well, not absolutely well</u>.

Favorable and unfavorable reactions to course experience may be viewed in two ways in terms of the differential effects of various reactions to a given course. For example, does Faculty Encouragement by

Science teachers still contribute to career decisions when perceived Difficulty is held constant, or is the correlation between Faculty Encouragement and career choice due to the fact that those who have been encouraged come to believe that they "have a flair" for Science?

Analysis of multivariate tables in which the indices are presented simultaneously produces two conclusions: In general, the course reaction indices make independent contributions to career choice, and the strongest single item is Faculty Encouragement.

Let us begin by examining Content, Difficulty, and Faculty Encouragement.

TABLE 1.38

CONTENT, DIFFICULTY, AND FACULTY ENCOURAGEMENT INDICES AND CAREER CHOICE DURING COLLEGE

a) Science Course Indices

Encouragement		Freshman Career					
		Science		Other		Letters	
Content	Difficulty	Yes	No	Yes	No	Yes	No
		Per cent Choosing Science Careers at Graduation					
High	Low	68 (527)	48 (279)	16 (1,634)*	3 (3,313)*	10 (63)	3 (269)
High	High	59 (49)	24 (104)	7 (268)*	2 (1,573)*	18 (17)	3 (147)
Low	Low	63 (101)	32 (82)	8 (527)*	1 (2,241)*	5 (20)	1 (230)
Low	High	42 (26)	18 (114)	5 (121)*	1 (2,544)*	0 (16)	0 (316)

N = ... 14,581*
Didn't take any Science . . 469*
NA 1,467*
Total N = ... 16,517*

b) Letters Course Indices

		Per cent Choosing Letters Careers at Graduation					
High	Low	25 (222)	7 (401)	13 (3,274)*	5 (4,476)*	52 (523)	48 (397)
High	High	- (6)	2 (55)	6 (90)*	2 (512)*	31 (13)	50 (22)
Low	Low	23 (74)	3 (390)	10 (817)*	3 (2,982)*	50 (115)	55 (144)
Low	High	- (8)	1 (137)	20 (76)*	1 (912)*	50 (14)	62 (26)

N = ... 15,686*
Didn't take any Letters . . 16*
NA 815*
Total N = ... 16,517*

*Weighted case base.

These conclusions are much the same as those for the zero order relationships. For Science courses, favorable reactions to Content, low perceived Difficulty, and Faculty Encouragement each contribute to choice of scientific careers, regardless of freshman choice. Furthermore, the percentage differences for Faculty Encouragement are generally stronger (as were the Q coefficients for this item). Thus, among freshmen choosing Science, those who report Faculty Encouragement but lesser interest and more Difficulty are about as likely to remain in Science as those reporting high interest and low Difficulty but no Encouragement. For Letters courses, the results are again similar. Each of the three items shows a Letters "pull" for freshmen starting in Science and Other, but among original Letters students, the combined indices (as in the case of the zero order coefficients) make no consistent difference.

Because of the importance of perceived Faculty Encouragement, it is worthwhile to also examine the independent effects of the two Faculty relationship items--Encouragement and Identification.

TABLE 1.39

FACULTY ENCOURAGEMENT, FACULTY IDENTIFICATION, AND CAREER CHOICE DURING COLLEGE

a) Science Faculty

Identification	Freshman Career					
	Science		Other		Letters	
Encouragement	Yes	No	Yes	No	Yes	No
	Per cent Choosing Science Careers at Graduation					
Yes	69 (459)	58 (244)	15 (1,456)*	10 (1,094)*	9 (70)	9 (46)
No	49 (225)	27 (355)	3 (2,838)*	1 (795)*	4 (274)	5 (7,194)

N = ... 15,050*
NA 1,467*
Total N = ... 16,517*

b) Letters Faculty

	Per cent Choosing Letters Careers at Graduation					
Yes	29 (217)	19 (94)	12 (3,147)*	11 (1,120)*	53 (505)	45 (162)
No	7 (358)	3 (626)	5 (3,697)*	2 (5,185)*	48 (299)	52 (292)

N = ... 15,702*
NA 815*
Total N = ... 16,517*

Again, it appears that Faculty Encouragement is a particularly strong correlate, the percentage differences being stronger and more consistent for the Encouragement indices than the Identification measures (with the usual exceptions among the freshmen choosing Letters).

In sum, it appears that Faculty Encouragement, Difficulty, Content Interest and Faculty Identification make cumulative contributions toward influencing career decisions, perceived Faculty Encouragement showing the strongest associations.

Because the students take a variety of courses, and it is possible for them to have favorable reactions to none, some or all of their classroom experiences, even stronger differences appear when we compare reactions to different courses. Essentially similar results turn up for each measure, but, as usual, the biggest differences appear for Faculty Encouragement.

TABLE 1.40

FACULTY ENCOURAGEMENT IN SCIENCE, FACULTY ENCOURAGEMENT IN LETTERS, AND CAREER CHOICE IN COLLEGE

Freshman Choice	Encouragement		Senior Choice			Total	
	Science	Letters	Science	Other	Letters	Per cent	N
Science	Yes	No	72	27	1	100	528
	Yes	Yes	39	42	19	100	158
	No	No	46	45	9	100	426
	No	Yes	4	64	32	100	143
Other	Yes	No	18	80	2	100	1,535*
	Yes	Yes	5	85	10	100	978*
	No	No	2	94	4	100	6,615*
	No	Yes	1	86	13	100	2,915*
Letters	Yes	No	15	49	36	100	39
	Yes	Yes	5	56	39	100	77
	No	No	2	50	48	100	432
	No	Yes	1	47	52	100	505
			N = ...				14,351*
			NA				2,166*
			Total N = ...				16,517*

The general trend is for the two types of Encouragement to pull in opposite directions, perceived Encouragement by Science Faculty pulling students toward scientific careers and perceived Encouragement by Letters faculty pulling them toward Letters careers. The net effect on career choice appears to be a function of the net effect of the two influences.

Table 1.41 illustrates the "net" interpretation by presenting Table 1.40 data in graph form.

Beginning with the freshmen choosing Science, among those reporting "No" Encouragement, 46 per cent remain in Science. For those who receive Encouragement by Science teachers but not Letters, the percentage rises to 72. However, for those who report Encouragement by both Letters Faculty and Science Faculty, the percentage drops to 39, and for those receiving Encouragement by Letters Faculty but not Science Faculty, the percentage drops to four. Thus, compared with the students reporting no Encouragement, those receiving predominantly scientific Encouragement are more likely to remain in Science, those receiving predominantly Letters Encouragement are quite unlikely to remain in Science, and those receiving both do not differ much from those receiving none--the two forces appear to "cancel each other out."

Although the percentage differences are smaller, the same pattern appears for Letters. Compared with the group receiving no Encouragement, those receiving Letters but not Science Encouragement are more likely to remain in Letters, while those receiving Science Encouragement are more likely to defect from Letters.

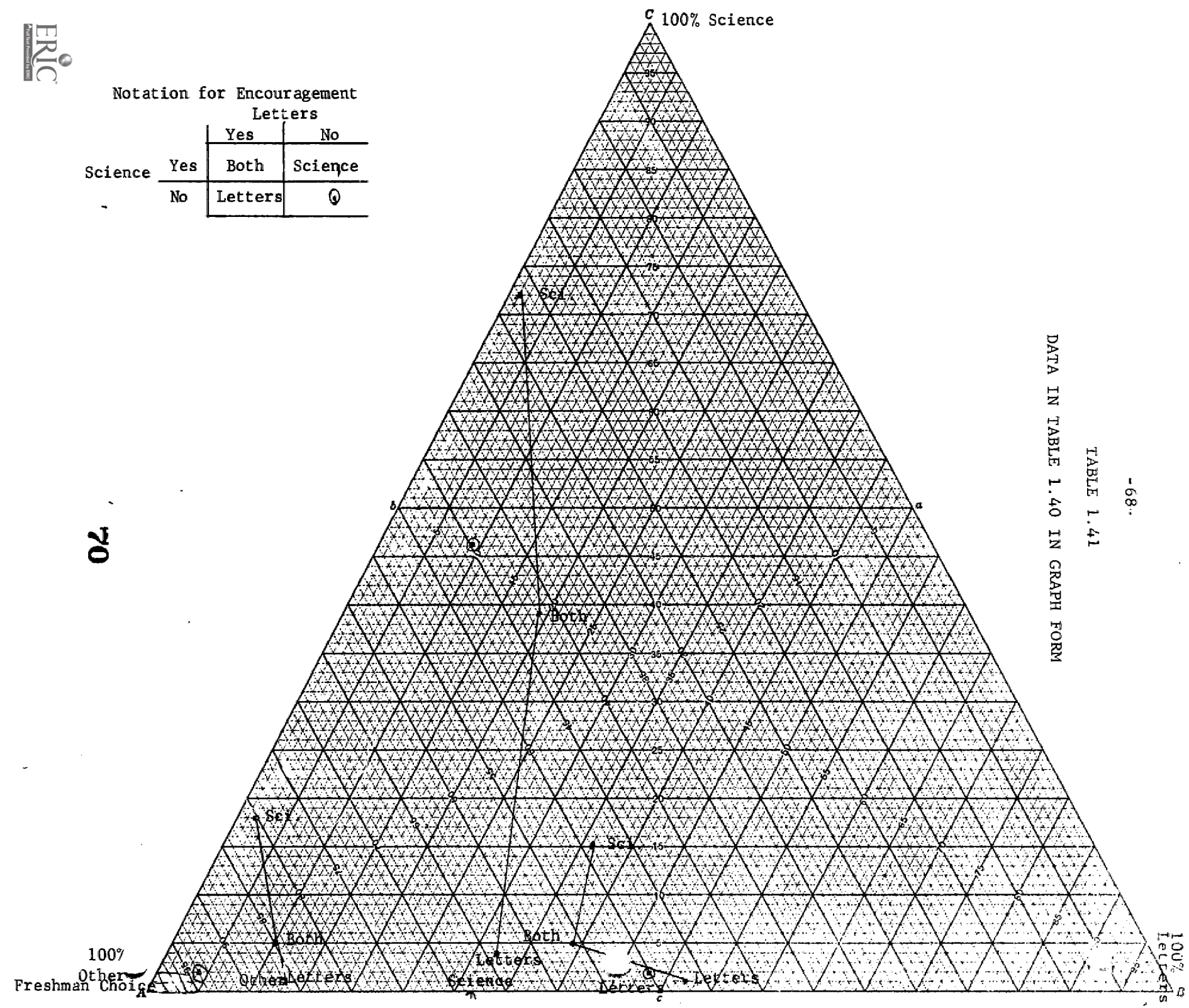
This interpretation holds, too, for Other. Compared with the non-Encouraged, those who report either Science or Letters Encouragement are more likely to shift into a Letters or Science career at graduation, while among those receiving dichotomous Encouragement, the result varies with the predominant influence.

TABLE 1.41

DATA IN TABLE 1.40 IN GRAPH FORM

Notation for Encouragement

Science	Letters: Yes	Letters: No
Yes	Both	Science
No	Letters	⊘



We can also compare the effects of perceived Faculty Encouragement with those of Occupational Values. Table 1.42 shows the simultaneous effects on choice of Science as a senior career--for students with various freshman choices--of Science Encouragement, Letters Encouragement, "Opportunity to work with people rather than things," and "Opportunities to be original, creative."

TABLE 1.42

SCIENCE ENCOURAGEMENT, LETTERS ENCOURAGEMENT, "OPPORTUNITY TO WORK WITH PEOPLE RATHER THAN THINGS," "OPPORTUNITIES TO BE ORIGINAL AND CREATIVE," FRESHMAN CAREER PREFERENCE, AND CHOICE OF SCIENCE

Freshman Choice	Values		Per cent Choosing Science as Seniors							
				Encouragement						
	People	Original	Science	No		Yes		Yes		No
			Letters	No		No		Yes		Yes
Science	No	Yes		59	(166)	86	(293)	51	(67)	12 (34)
	No	No		47	(108)	70	(112)	45	(20)	5 (21)
	Yes	Yes		27	(67)	37	(49)	24	(46)	2 (49)
	Yes	No		29	(73)	37	(57)	22	(23)	0 (38)
Other	No	Yes		6	(1,263)*	27	(513)*	18	(172)*	1 (429)*
	No	No		4	(1,582)*	25	(306)*	1	(146)*	1 (443)*
	Yes	Yes		1	(1,803)*	4	(341)*	3	(396)*	0 (1,178)*
	Yes	No		1	(1,842)*	11	(366)*	3	(263)*	0 (864)*
Letters	No	Yes		5	(127)	18	(17)	4	(24)	0 (144)
	No	No		5	(43)	-	(5)	-	(8)	0 (47)
	Yes	Yes		0	(158)	9	(11)	0	(31)	1 (203)
	Yes	No		1	(95)	-	(5)	7	(14)	1 (101)

N =	14,163*
NA, Values or Encouragement	2,354*
Total N =	16,517*

Consistent with our formulation, both Values and Encouragement are associated with the choice of Science as a career (an essentially similar table for choice of Letters will not be presented in order to conserve space). Reading across the rows it is seen in each comparison that those receiving Science but not Letters Encouragement are more likely to end up in Science than those not thus encouraged, while Letters Encouragement lowers the percentages. Reading down the columns, it is seen that a disinterest in working with people and an interest in being original and creative are predictive of Science choices (except that "original" makes no difference among the people-oriented). At the extremes, 86 per cent of the Science freshmen who report appropriate values and relatively greater Science Faculty Encouragement remain in Science, while among those with the least appropriate values and Letters Encouragement only, the percentage is zero

When the opposite extremes are compared, it is seen that those with only Science Encouragement but "inappropriate values" are more likely to remain in Science than those with appropriate values and only Letters Encouragement. Because these groups are roughly equal in size (and thus at the same extremes on the two distributions) this argues that Encouragement is the more powerful variable

While it appears that the students' perceptions of their relative success in various courses have considerable impact on their career plans, we should not ignore another standard of comparison--the grade point average. Viewed as a social psychological variable, the student's GPA may be interpreted as his index of comparison of his general academic performance across a variety of courses with that of other students Table 1 43 shows the effects of GPA on career choice, controlling for the two Encouragement indices.

As it stands, Table 1.43 cannot be read easily, and thus we shall translate it into a series of Difference tables. First, let us look at the difference in percentages between those encouraged and those not encouraged by Science teachers.

TABLE 1.43

GRADE POINT AVERAGE, SCIENCE ENCOURAGEMENT, LETTERS ENCOURAGEMENT, AND SENIOR CAREER PREFERENCE, CONTROLLING FOR FRESHMAN CAREER PREFERENCE

Freshman Preference	Encouragement		GPA	Senior Preference			Total	
	Science	Letters		Science	Other	Letters	Per cent	N
Science	No	No	IV, VI, VII B+	55	27	18	100	60
			V B+	44	48	8	100	360
	Yes	No	V, VI, VII B+	81	18	1	100	187
			IV B+	68	31	1	100	328
	Yes	Yes	IV, V, VI B+	39	46	15	100	59
			VII B+	39	40	21	100	98
	No	Yes	IV, VII B+	7	33	60	100	27
			V, VI B+	3	71	26	100	115
Other	No	No	IV, V B+	4	90	6	100	843*
			VI, VII B+	2	95	3	100	5,658*
	Yes	No	IV, V, VII B+	22	76	2	100	422*
			VI B+	16	82	2	100	1,078*
	Yes	Yes	IV, V, VII B+	4	80	16	100	288*
			VI B+	6	87	7	100	677*
	No	Yes	IV, V B+	1	79	20	100	556*
			VI, VII B+	1	89	10	100	2,330*
Letters	No	No	IV, V B+	2	38	60	100	80
			VI, VII B+	2	53	45	100	346
	Yes	No	IV, V, VI B+	8	46	46	100	13
			VII B+	19	50	31	100	26
	Yes	Yes	IV, V, VI B+	9	55	36	100	33
			VII B+	2	57	41	100	44
	No	Yes	IV, V B+	1	34	65	100	158
			VI, VII B+	1	53	46	100	338

N = ...	14,124*
NA, Encouragement or GPA . .	2,393*
Total N = ...	16,517*

TABLE 1.44

DIFFERENCE IN CAREER CHOICE BETWEEN STUDENTS REPORTING ENCOURAGEMENT BY SCIENCE TEACHERS AND THOSE NOT REPORTING ENCOURAGEMENT BY SCIENCE TEACHERS

Freshman Choice	Letters Encouragement	GPA	Difference in the Per cent Entering....		
			Science	Other	Letters
Science	No	V = VII B+	+ 26	- 9	- 17
		VI = VII B+	+ 24	- 17	- 7
	Yes	V = VII B+	+ 32	+ 13	- 45
		VI = VII B+	+ 36	- 31	- 5
Other	No	V = VII B+	+ 18	- 14	- 4
		VI = VII B+	+ 14	- 13	- 1
	Yes	V = VII B+	+ 3	+ 1	- 4
		VI = VII B+	+ 5	- 2	- 3
Letters	No	V = VII B+	+ 6	+ 8	- 14
		VI = VII B+	+ 17	- 3	- 14
	Yes	V = VII B+	+ 8	+ 21	- 29
		VI = VII B+	+ 1	+ 4	- 5

The table may be read as follows: Consider the +26 for the top row and lefthand column. This means that among freshmen choosing Science, who report no Encouragement by Letters Faculty, and who report a cumulative GPA of B+ or better, there is a 26 per cent difference in the number choosing Science at graduation, depending on whether they report Encouragement by Science Faculty. The important aspect of the table is the pattern of signs, and it is seen that in the Science column, all signs are positive, while in the Letters column, all signs are negative. That is, controlling for freshman choice, Letters Encouragement, and GPA, perceived Encouragement by Science Faculty is associated with overchoice of Science and underchoice of Letters careers at graduation.

Table 1.45 reports the same information for Letters Encouragement.

TABLE 1.45

DIFFERENCE IN CAREER CHOICE BETWEEN STUDENTS REPORTING ENCOURAGEMENT BY LETTERS FACULTY AND THOSE NOT REPORTING LETTERS ENCOURAGEMENT BY LETTERS FACULTY

Freshman Choice	Letters Encouragement	GPA	Difference in Per cent Entering.....		
			Science	Other	Letters
Science	No	≥ B+	- 48	+ 6	+ 42
		≤ B+	- 41	+ 23	+ 18
	Yes	≥ B+	- 74	+ 15	+ 59
		≤ B+	- 65	+ 40	+ 25
Other	No	≥ B+	- 3	- 11	+ 14
		≤ B+	- 1	- 6	+ 7
	Yes	≥ B+	- 18	+ 4	+ 14
		≤ B+	- 10	+ 5	+ 5
Letters	No	≥ B+	- 1	- 4	+ 5
		≤ B+	- 1	0	+ 1
	Yes	≥ B+	+ 1	+ 9	- 10
		≤ B+	- 17	+ 7	+ 10

The pattern here is the exact opposite. With one exception, Letters Encouragement is associated with a lesser per cent in Science and a greater per cent in Letters.

Tables 1.44 and 1.45 merely reveal that the Encouragement effects remain when GPA is held constant. Table 1.46 shows the independent effect of GPA itself.

TABLE 1.46

DIFFERENCE IN CAREER CHOICE BETWEEN STUDENTS REPORTING A GRADE POINT AVERAGE OF B+ OR BETTER AND THOSE REPORTING A GRADE POINT AVERAGE OF LESS THAN B+

Freshman Choice	Encouragement		Difference in Per cent Entering....		
	Science	Letters	Science	Other	Letters
Science	Yes	No	+ 11	- 21	+ 10
	No	No	+ 13	- 13	0
	Yes	Yes	0	- 6	- 6
	No	Yes	+ 4	- 38	+ 34
Other	Yes	No	+ 2	- 5	+ 3
	No	No	+ 6	- 6	0
	Yes	Yes	- 2	- 7	+ 9
	No	Yes	0	- 10	+ 10
Letters	Yes	No	0	- 15	+ 15
	No	No	- 11	- 4	+ 15
	Yes	Yes	+ 7	- 2	- 5
	No	Yes	0	- 19	+ 19

The pattern in Table 1.46 is somewhat different. GPA has no consistent effect on choice of Science and no consistent effect on choice of Letters, but it has a consistent negative effect on choice of Other. Since the opposite of Other is Arts and Science, we can say that the effect of high general academic achievement is a pull to Arts and Science careers in general, but no consistent pull toward Science or toward Letters, when Faculty Encouragement is held constant.

We are now ready to summarize the results of this detailed analysis of the relativity of ability judgments. In proposition form, our interpretation is as follows:

1) Doing well academically, relative to other students, tends to influence an undergraduate toward careers in Arts and Science, but not toward Science or Letters in particular.

2) Doing well in a particular Arts and Science area, relative to performance in other courses, (particularly being encouraged by the teachers to go on in the field) tends to influence an undergraduate toward a career in that content area.

While the survey data do not enable us to document the social psychological processes involved, we may speculate that it proceeds somewhat as follows: Since no "hard" evidence is available to the undergraduate concerning his abilities and chances for success in various lines of work, he must seize upon the best approximation available. Concerning Arts and Science careers (we have not performed similar analyses for other specific occupations) the best "analogue" of actual work in Arts and Science fields is his course "work." As he proceeds through his studies, he amasses a cumulative grade point average, which is the best index available to him of how his general performance in academic work stacks up. If his GPA tells him that he has been successful in college, his prediction is that he will be successful in professional Arts and Science work. In addition, his experience in various courses will produce some differences of perception of various Letters and Science fields. Even good students do relatively poorly in some courses and even poor students do relatively well in some courses. To the extent that his experience creates a perceived differential--if, for example, his experiences in Science are relatively more positive than his experiences in Letters--(since he can only enter one field as a career) that field will exercise an especially strong attraction for him.

Viewed in this light, undergraduate studies take on the appearance of an unplanned "junior management training program" in which candidates for top positions in the firm are rotated around through various plants and divisions, and their over-all success used to gauge their potential while their particular successes are used to find them a particular position in the firm.

One might even be led to consider the idea that American society has hit upon a particularly felicitous mechanism for facilitating occupational choice among its future elites, but further consideration suggests that the process is not all that rational and that there is a certain inherent inefficiency in the process. These negative reflections come to the fore when we re-examine the data on school differences in occupational choice in the light of our findings on perceived ability.

College as a Boundary for Comparisons

A particularly puzzling finding in this research has been the fact that there is such a small association between college quality and career choice, once freshman career plans are controlled. One's offhand reaction might be to accept the findings at face value and conclude that the high prestige institutions are simply ineffective in this regard. But from indirect evidence we are led to the conclusion that college quality plays a subtle but important role in career choice.

A most significant difference between various American institutions of higher education is the wide variation in the average ability (IQ) of their students. Because grade and high schools in America tend to recruit the total populations of youth in their geographic areas, generally speaking, the variation in talent among primary and secondary schools is due to variations in the talent levels of large and fairly heterogeneous populations. Since, however, colleges tend to select students, and students to select colleges, on a much freer basis, American colleges tend to show less heterogeneous ability levels and more variation from school to school.

With this situation in mind, we can think of two different measures of a student's academic ability--his rank among all students and his rank within his particular school. If ability were independent of undergraduate institutions, the two measures would be identical. (If students were randomly assigned to undergraduate institutions, the top 20 per cent in each school would be identical with the top 20 per cent in the total universe of students), but to the extent that there is a correlation between ability and the institution attended, the two rankings will diverge. It is entirely possible for a student to be in the bottom 20 per cent at a very selective school and somewhere in the top ranks of a national distribution. It follows from all of this that where such a correlation exists, for a student with a given rank in the total population, the better his school, the lower his rank within that school.

These formal statistical principles lead us to look a little more carefully at grade point average--the best single measure of academic performance available to us (and to the students). It is quite clear that grade point averages amount to a measure of "rank within school"--for grades are essentially constant across quality levels.

TABLE 1.47

GRADE POINT AVERAGE BY SCHOOL QUALITY LEVEL AND FRESHMAN CAREER PREFERENCE

Freshman Career Preference	School Quality	Grade Point Average			Total	
		B+ or Higher	B and B-	C+ or Lower	Per cent	N
Science	I-II	32	39	29	100	284
	III	26	39	35	100	788
	IV	25	42	33	100	270
Letters	I-II	25	48	28	101	227
	III	25	46	29	100	773
	IV	29	39	32	100	330
Other	I-II	17	48	35	100	668*
	III	17	38	45	100	7,516*
	IV	19	40	41	100	4,400*
				N = ...		16,256*
				NA, GPA		261*
				Total N = ...		16,517*

As one would expect from previous analyses, those freshmen aiming for Arts and Science careers end up with higher GPA's, and there are no consistent differences in GPA by quality level.

We have no suitable measure of rank among all students, but an approximation is given by examining those students who checked "A National Merit Scholarship holder, Finalist, or Semi-Finalist." Since the National Merit Scholarship Corporation testing program covered almost all of these students when they were in high school, and since those students who were Semi-Finalists or better represent a fixed cut-off point on the test, we can assume that these students represent a group of uniformly high talent. Because, however, they constitute only the

top three per cent of the population, we cannot say that the remainder represent a homogeneous ability group. Table 1.48 shows the grade point average of these National Merit scholars in various school quality levels, in a special tabulation from the total weighted sample of the survey.

TABLE 1.48

SCHOOL QUALITY AND GPA AMONG NATIONAL MERIT SCHOLARS, CONTROLLING FOR SEX

(Per cent with a GPA of B+ or Higher)

School Quality	Sex	
	Male	Female
I-II	81 (529)*	86 (234)*
III	88 (393)*	98 (278)*
IV	99 (138)*	100 (79)*

Total Weighted N = 1,651*

As expected, even though this top talent group does very well in each quality level, the better the school, the less likely they are to achieve a GPA of B+ or higher.

Turning to the total sample from the survey, the National Merit scholars can be used to check the second claim--that low GPA students in the best schools often have higher ability than students with higher GPA's from less selective institutions.[14] Because of the large case base, School Quality is broken into four groups, rather than the two and three category divisions used in smaller subsamples.

[14]The test, of course, involves the assumption that the degree of improvement or decline in ability since high school is unrelated to the quality of the undergraduate institution.

TABLE 1.49

SCHOOL QUALITY, GPA, AND NATIONAL MERIT SCHOLARS

(Per cent Who Are National Merit Scholars)

School Quality	Grade Point Average									
	C or Lower		C+		B-		B		B+ or Higher	
I	5.1	(470)	8.9	(688)	13.7	(866)	17.7	(688)	26.4	(690)
II	1.0	(500)	4.4	(967)	2.8	(1,170)	8.6	(688)	14.8	(822)
III	0.3	(4,816)	0.5	(8,031)	1.5	(7,294)	2.7	(4,804)	7.1	(5,434)
IV	0.1	(2,440)	0.0	(4,744)	0.7	(4,231)	1.2	(2,961)	4.5	(3,457)

N = ... 55,761
NA 903
Total Weighted N = ... 56,664*

*Because of differing sampling ratios in the various strata of the survey, the 34,000 questionnaires yield an unbiased estimate of the total population only when weighted in such a fashion that their total weighted N is 56,664.

The results are (of mathematical necessity) as expected, and some of the differences are striking...C+ students in Quality Level I surpassing B+ students in Level III, B students in I surpassing B+ students in II, III, and IV, B- students in III surpassing B students in IV, and perhaps the most striking of all, C students in Level I surpassing B+ students in Level IV.

Returning to the special sample drawn to facilitate analyses of Arts and Science career choice, let us see the simultaneous relationships between School Quality, Grade Point Average, and Career Choice (Table 1.50).

For B+ or better students there is some trend toward Arts and Science as school quality increases (this is the Letters pull of the higher quality schools noted earlier in the chapter), but for the remaining students there is no school quality effect.

TABLE 1.50

SCHOOL QUALITY, GRADE POINT AVERAGE, AND CAREER CHOICE

(Per cent Choosing Letters or Science Careers as Seniors)

Freshman Career	School Quality	Grade Point Average									
		B+ or Higher		B		B-		C+ or Higher		C or Lower	
Science or Letters	I-II	75	(146)	57	(93)	58	(127)	56	(88)	53	(57)
	III	69	(398)	63	(290)	52	(374)	46	(351)	39	(148)
	IV	64	(164)	61	(103)	65	(139)	45	(124)	37	(70)
Other	I-II	25	(281)*	15	(317)*	11	(482)*	10	(410)*	4	(178)*
	III	17	(1,280)*	10	(1,149)*	11	(1,740)*	8	(2,203)*	9	(1,144)*
	IV	14	(825)*	6	(766)*	8	(1,013)*	6	(1,238)*	7	(558)*

N = ... 16,256*
NA, GPA 261*
Total N = ... 16,517*

Table 1.50, of course, merely restates the original finding which puzzled us. Tables 1.48 and 1.49, however, put the results in a different perspective. If we take the proposition of Merit Scholars as an index of rank in the total population, a case can be made that school quality has a negative association with choice of Arts and Science careers, when rank in total population is held constant. Table 1.49 tells us that B students in Level I-II have a higher standing in the general population than B+ students in III, but they are <u>less</u> likely to end up in Arts and Science careers; B- and C+ students in I and II surpass B students in III and IV, but they are <u>less</u> likely to end up in Arts and Science careers. Not all of the cross-comparison produces a striking reversal, but the trends are definite enough that we would predict that a better measure of rank in the universe would produce the negative correlation posited.

Rather than treating specific cell comparisons, we may advance the general statement that since there is a striking difference in the talent levels of the schools and very little difference in the Arts and Science influence of different quality levels, the top-flight schools appear to be producing fewer Arts and Science professionals than their talent supply would lead one to predict.

Why should this be so? The theory of "relative deprivation" provides an avenue of interpretation.[15] In fact, the situation quite resembles the original findings by Samuel A. Stouffer and his associates which produced the theory. Stouffer, in an analysis of the morale of servicemen in World War II, noted that, although the Airmen had higher promotion rates than the Military Police, Airmen tended to be more critical of promotions than Military Police. Stouffer reasoned that soldiers judge their situations by comparison with others in their units and that in the Air Force, where promotions were common, being promoted was no special accomplishment while not being promoted was seen as unfair because so many comparison soldiers had received stripes. Conversely, where promotions were rare, those who "made it" felt that they had done relatively well, while the non-promoted had fewer complaints since few of their buddies had surpassed them.

Let us translate this idea into the terms of the present problem. If one is willing to assume that college students judge their ability, not in terms of their general standing among all college seniors, but in comparison with the others in their institutions (i.e., in terms of GPA), then we would expect the following: In the most selective schools the most of the students come from the nation's top talent levels. But since grades are given in terms of relative standing only within the institution, in the high quality schools the students tend to underrate their ability because they are using other top students for comparison. Conversely, in the less selective schools a low quality student will tend to overrate his ability since he will tend to do fairly well in competition with other less able students. This lowering of self-judgments by exposure to the competition in top-flight schools will then

[15]Cf. James A. Davis, "A Formal Interpretation of the Theory of Relative Deprivation," Sociometry, Vol. 22, No. 4, December, 1959, 280-296.

tend to cancel out so that there is very little difference in ability judgments by school quality, and consequently few school-quality differences in recruitment to Letters and Science.

Before speculating further, let us look at school-quality differences in the other ability measure--Faculty Encouragement.

TABLE 1.51

SCHOOL QUALITY, FRESHMAN CAREER CHOICE, ENCOURAGEMENT BY SCIENCE FACULTY, AND ENCOURAGEMENT BY LETTERS FACULTY

Freshman Preference	School Quality	Encouragement: Science	No	Yes	Yes	No	Total Percent	Total: Per cent		N
		Encouragement: Letters	No	No	Yes	Yes		Science	Letters	
Science	I-II		42	33	13	11	99	46	24	269
	III-IV		32	44	12	12	100	56	24	986
	Difference		-10%	-11%	+ 1%	- 1%		-10	0	
Letters	I-II		48	4	5	43	100	9	48	203
	III-IV		42	3	7	48	100	10	55	948
	Difference		+ 6%	+ 1%	- 2%	- 5%		- 1	- 7	
Other	I-II		53	13	8	25	99	21	33	1,632*
	III-IV		56	12	8	24	100	20	32	10,771*
	Difference		- 3%	+ 1%	0%	+ 1%		+ 1	+ 1	
		N =								14,809*
		NA or Didn't take course								1,708*
		Total N =								16,517*

Various analyses of the Encouragement indices have yielded little information about the nature of the Encouragement factor. In fact, the only consistent correlate located is GPA. Thus, we do not know whether the students construe Encouragement as meaning direct interpersonal influence attempts, favorable remarks on term papers, or offhand remarks after class, and we

not know the extent to which cognitive perceptual mechanisms distort the students' perceptions (it could be that a student who has decided to enter Science misperceives quite casual comments by his Science teachers as exhortations to enter a scientific career). Whatever it really is, there appears to be no more of it, perhaps even a little less, in the highest quality institutions. In particular, freshmen interested in Science careers less often report Encouragement by Science Faculty in the quality group I-II.

The speculation runs far beyond our data, but one wonders whether academic faculties are subject to the same perceptual pressure which appears to be operating on their students--the tendency to judge students in terms of their rank within the particular institution, rather than in terms of their national standing. If this were the case, we would find little variation in Encouragement by school quality, as in Table 1.51.

To the extent that our interpretations--which admittedly are based on quite indirect evidence--are correct, it is not true that school quality is irrelevant for the choice of Arts and Science careers. Rather, the effect of a particular institution may be viewed as establishing a boundary within which ability comparisons are circumscribed by both Faculty and students, with the net result that judgments of ability on both sides tend to become distorted.

Because speculation is cheap, let us assume that our interpretation is correct and trace out several of the implications of this idea, some of which are rather disconcerting and some of which produce promising ideas for improvement. To the extent that the "relative deprivation" phenomenon holds, we may expect the following:

First, the greater the tendency toward differentials between colleges in ability levels, the lower the calibre of students we would expect to be recruited into Arts and Science careers. If, at one extreme, all colleges had identical ability distributions and the top 15 per cent went into Arts and Science careers, then these fields would

recruit the top 15 per cent of college talent. If, at the other extreme, there was no overlap at all between the ability levels of colleges, and the top 15 per cent within each school entered Arts and Science careers, it would turn out that those students entering Arts and Science careers would be little different from students in general in terms of "true" ability.

Second, there is no reason to believe that this phenomenon does not continue as one moves up the educational ladder. Alan Berger of NORC is currently conducting a panel survey of freshman entrants at the University of Chicago. He finds that, prior to arrival on campus, 67 per cent of the carefully selected Chicago freshmen expected to make the Dean's List, while past experience suggests that 19 per cent will actually do so; 29 per cent expect to make Phi Beta Kappa in comparison with a realistic expectation of two per cent; 64 per cent expect to graduate with honors in comparison with a realistic figure of four per cent, and so on. If our analysis is correct, we may expect that actual exposure to a highly selective institution may have the net effect of reducing a student's confidence in his academic ability, rather than enhancing it--if he uses his fellow students as a reference group. When, in turn, we consider that those students who go on to graduate study are selected from the top of their college graduating classes and concentrated in the high quality graduate centers, the net effect of Master's-level studies and then of Ph.D.-level studies may be to further depress the self-ratings of these highly intelligent young people. Certainly anyone connected with the graduate faculty of a major university is aware of young people who, although undoubtedly in the very top of the national talent distribution, come to see themselves as mediocre (and are seen by their faculties as mediocre) because they are not in the top ranks in a highly selected population.

We began this research by noting that college seniors as a group represent the small fraction of survivors in a process of educational selection, so that our entire sample falls in the top 10 per cent of the American population in terms of educational attainment.

While we have seen that those who are lost along the way receive lesser rewards in terms of occupational success and income, we have now come to the inference that the survivors suffer somewhat in the process, for the relentless attrition of higher educational selection means that the further one progresses in education (and the higher the quality of the educational institution one enters) the worse one does academically, when academic achievement is defined by students and teachers as relative standing within a particular student body. In an era when the cry of "raise standards" is a major slogan for educators, we must not forget some of the unfortunate consequences which may arise from relentless raising of standards of competition.

Having considered two disturbing implications of our findings, let us conclude with some more promising ones.

Third, these data suggest that the less-than-top students in the leading colleges and universities constitute a relatively untapped pool of talent for careers in Arts and Sciences. If our interpretation is correct--that a number of truly able students refrain from entering Arts and Science careers because they are only average students in top schools--then these young people constitute a source of talent supply which may be drawn on to decrease the gap between supply and demand in the Arts and Science professions. We should not expect vast numbers of them to become available, but they do constitute an untapped resource.

Fourth, these data suggest some simple and workable action programs for influencing recruitment to Letters and Science careers. By and large, those people concerned with manpower programs have concentrated upon scholarship and fellowship programs as a recruiting device. Our data would lead us to cast some doubt on the efficacy of such programs. If self-judgments of ability play a major role in influencing recruitment to Arts and Science, those students lost because they have unrealistically low estimates of their ability are quite unlikely to apply for scholarships and fellowships, since they are screened out prior to the point where financial aid can make a difference. Our findings substantiate

the general conclusions that occupational values and judgments of ability are the two major factors in the selection of careers in Science or in Letters. Even though values are notoriously difficult to modify, judgments of ability should be rather less resistant.

Two relatively inexpensive techniques are immediately suggested. First, if one can assume that perceived encouragement has some basis in actual faculty behavior, one should encourage the faculty to encourage, particularly faculty members in the leading institutions who appear as blinded by the campus comparison boundary as their students. When one considers how carefully high schools work to influence the college plans of their students, and how little American colleges do to guide and encourage their highly talented undergraduates, many avenues of action (which do not require millions of dollars of government aid) come to mind.

Second, attempts could be made to break through the campus comparison barriers by enabling students to more realistically evaluate their rank in the total college population. The obvious idea would be to develop a national testing program for college students akin to the Graduate Record or the National Merit Scholarship testing programs. Several factors should be considered in such an exam: a) coverage must be very wide, not limited only to those already interested in Letters or Science; b) the testing should take place early enough in the college career to enable the student easily to change his curriculum plans; c) there should be a carefully planned and explained feed-back of the results to students showing high promise. The suggestion of our materials is that making the students themselves aware of their realistic standing would have positive effects both in recruiting students whose self-ratings are too modest and also in providing a caution to those students who have been led to overrate their capacities.

D) Conclusions

Having reviewed in considerable detail the general process of educational selection in contemporary America, and the factors involved in the choice of Science careers and Letters careers among those students who survive to receive the bachelor's degree, we shall conclude by examining the net results, the ways in which seniors who expect to enter Arts and Science fields differ.

Although the strongest differences are those familiar to us from the detailed analyses of change, the results are not quite identical, because the characteristics of a particular group at graduation are the net result of blending those who remain in the field, those who shift in, and subtracting those who shift out.

Table 1.52 shows the seven items which are characteristic of students entering Arts and Science careers, in the sense that the items distinguish between these two fields and Other, but show no difference between Letters and Science.

TABLE 1.52

ARTS AND SCIENCE CHARACTERISTICS (Q)

Characteristic	Science/Other	Letters/Other	Science/Letters
Grade Point Average	(.40)	(.40)	.00
Academic Performance Index.	(.38)	(.44)	-.07
Original and Creative . . .	(.28)	(.44)	-.18
Leadership (not)	(.36)	(.28)	.10
Religiousness (Low)	(.23)	(.38)	.17
Cooperative (not)	(.20)	(.24)	-.04
School Region (South) . . .	(.23)	(.33)	-.11

Generalized interest and perceived success in academic matters appears to be the closest to a common denominator among entrants into Arts and Sciences, GPA, API, and "Original and creative" being three of the seven items showing an Arts and Science trend. Along with these go a certain social unconventionality (not desiring leadership, not being religious, and not seeing oneself as cooperative) and attending a school in the South.

There are two additional items which distinguish between Science and Other, Letters and Other, but also show a difference between Letters and Science. They are both measures of self-defined intellectualism.

TABLE 1.53

ARTS AND SCIENCE CHARACTERISTICS WHICH ALSO DISTINGUISH BETWEEN LETTERS AND SCIENCE (Q)

Characteristic	Science/Other	Letters/Other	Science/Letters
World of ideas	.26	.52	-.30
Intellectual .	.30	.52	-.26

While interest in the world of ideas and self-ratings as intellectual distinguish between Other and Arts and Science, Letters entrants also tend to be higher than scientists on these items.

A further set of items distinguishes among each of the three divisions, with Letters and Science at the extremes, and Other "in the middle."

TABLE 1.54

ITEMS DISTINGUISHING AMONG ALL THREE DIVISIONS (Q)

Characteristic	Science/Other	Letters/Other	Science/Letters
Encouragement (Letters) .	-.55	.51	-.83
Identification (Letters) .	-.36	.52	-.26
Content (Letters) .	-.35	.28	-.58
Difficulty (Letters - Low) . .	-.26	.36	-.57

These, of course, are the four indices of course-reactions to Letters courses and they provide the best set of items for distinguishing among the three fields, with scientists tending to be low, those entering Letters fields high, and Other in the middle.

Nine items show a "Science" pattern, differentiating between scientists and those entering the other two fields, but not showing high differences between Letters and Other.

TABLE 1.55

ITEMS DISTINCTIVE OF STUDENTS ENTERING SCIENCE (Q)

Characteristic	Science/Other	Letters/Other	Science/Letters
Encouragement (Science) .	.77	-.17	.83
Work with people (Not) .	.76	.18	.67
Difficulty (Science - Low)	.58	-.12	.66
Content (Science)	.55	-.14	.64
Identification (Science).	.54	-.07	.58
Poised (not)	.32	.10	.41
Sex (Male)	.28	-.12	.39
Helpful to others (Not) .	.31	-.02	.29
Outgoing (Not).	.24	.03	.26

The Science items consist of the four Science course-reaction indices, values and personality characteristics, and sex.

Eleven items fall into the pattern which suggests that they are characteristic of students who plan to enter Letters careers. (See Table 1.56.)

The items characteristic of Letters career entrants are values and experience in student activities with a Letters flavor.

TABLE 1.56

ITEMS DISTINCTIVE OF STUDENTS ENTERING LETTERS (Q)

Characteristic	Science/Other	Letters/Other	Science/Letters
tured	-.14	.42	-.53
ue Group Activity . .	-.05	.44	-.48
torial Staff	.00	.40	-.40
inant	-.19	.32	-.46
ic or Drama Group . .	.10	.36	-.44
ey (Not)	-.05	.32	-.37
io-Economic States High)	-.04	.32	-.36
ady Progress (Not) .	.02	.29	-.27
h Strung	.05	.29	-.25
et (Not)	-.10	.24	-.33
dy	.09	.28	-.20

The remaining items in the analysis either show no Q values of .20 or greater or only one such coefficient, so that they do not meet our criteria for classifying relationships. Included, along with a number of the self-descriptive adjectives, are Original Religion, Size of Hometown, School Quality, School Size, School Control, School Region other than South, certain student activities (Fraternities, Athletics), the Occupational Values avoiding high pressure, and freedom from supervision.

Despite the fact that college seniors represent a homogeneous population highly selected in the process of educational attrition, at graduation those students who aim for careers in the Sciences and in Letters are a distinctive subgroup. They are differentiated from seniors in general, not in terms of their type of school or family social characteristics, but in terms of their interests and values and in terms of college experiences which led them to define themselves as appropriate recruits to the professions associated with higher learning.